

Service Manual

COMPACT
disc
DIGITAL AUDIO

DIGITAL

MASH *
multi-stage noise shaping

Compact Disc Player
SL-PG340



Colour

(K) ... Black Type

Area

Suffix for Model No.	Area	Colour
(P)	U.S.A.	(K)
(PC)	Canada.	

- ※
- Technics (or Panasonic) developed the world's first MASH type DAC and ADC. MASH technology was invented by NTT (LSI Labs).
 - MASH is a trademark of NTT.

SL-PG440 MECHANISM SERIES (RAE0111Z)

SPECIFICATIONS

■ Audio

No. of channels	2 (left and right, stereo)
Frequency response	2-20,000 Hz, ± 1 dB
Output voltage	2 V (at 0 dB)
Dynamic range	92 dB
S/N	100 dB
Total harmonic distortion	0.007 % (1 kHz, 0 dB)
Wow and flutter	Below measurable limit
DA converter	MASH (1 bit)
Output impedance	Approx. 1 k Ω
Load impedance	More than 10 k Ω

■ Pickup

Wavelength	780 nm
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■ General

Power consumption	12 W
Power supply	AC 120 V, 60 Hz
Dimensions (W×H×D)	430×102.6×280 mm (16 ¹⁵ / ₁₆ "×4 ¹ / ₃₂ "×11 ¹ / ₃₂ ")
Weight	3.4 kg (7.5 lb)

Note:

Design and specifications are subject to change without notice.
Weight and dimensions are approximate.

Technics

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■ PRECAUTION OF LASER DIODE

CAUTION: This unit utilizes a class 1 laser. Invisible laser radiation is emitted from the optical pickup lens when the unit is turned on:

1. Do not look directly into the pickup lens.
2. Do not use optical instruments to look at the pickup lens.
3. Do not adjust the preset variable resistor on the optical pickup.
4. Do not disassemble the optical pickup unit.
5. If the optical pickup is replaced, use the manufactures specified replacement pickup only.
6. Use of control or adjustments or performance of procedures other than those specified herin may result in hazardous radiation exposure.

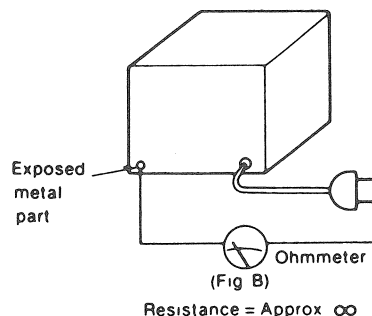
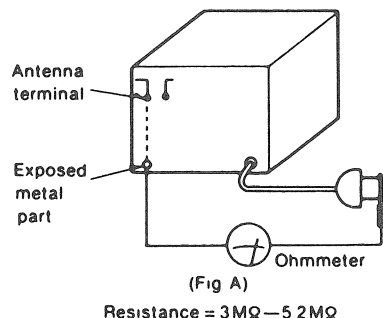
■ SAFETY PRECAUTION (This "safety precaution" is applied only in U.S.A.)

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

• INSULATION RESISTANCE TEST

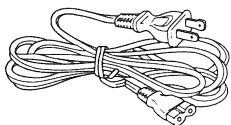
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between $3M\Omega$ and $5.2M\Omega$ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.

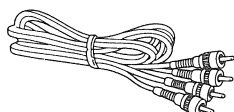


4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

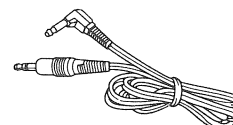
ACCESSORIES



AC power supply cord (polarized) . . 1 pc
(For U.S.A.: SJA175-1)
(For Canada: SJA172)



Stereo connection cable (SJP2249-3) . . 1 pc.

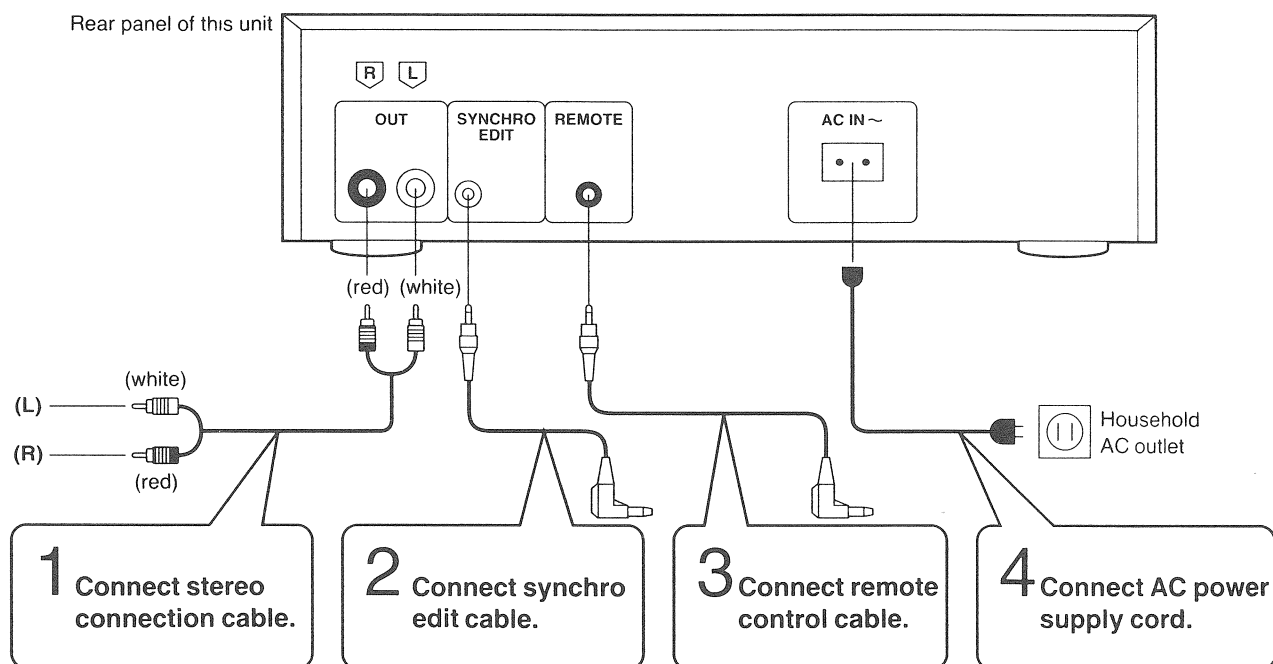


Remote control cable . . 1 pc
(SJP2257T)

CONNECTIONS

Before making connections, be sure that the power of this unit and all other system components is first turned off.

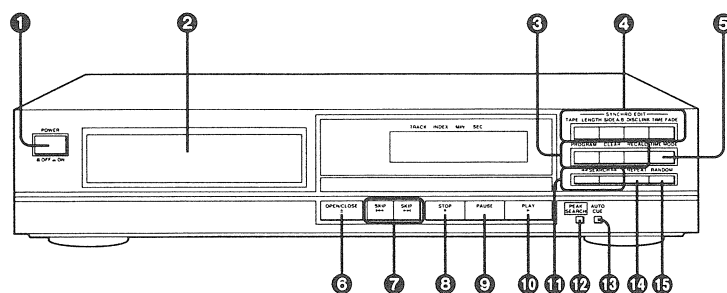
See the operating instructions of the amplifier or the cassette deck for details.



- 1 Connect the stereo connection cable (included) to the "CD" or "AUX" terminals of the amplifier.
- 2 Connect the synchro edit cable (SJP2257T, included with the cassette deck) to the "SYNCHRO EDIT" terminal of the Technics cassette deck.

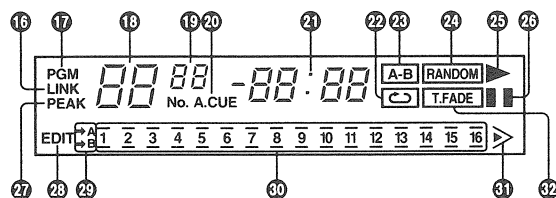
- 3 Connect the remote control cable (SJP2257T, included) to the "REMOTE" terminal of the Technics receiver or cassette deck.
- 4 Connect the AC power supply cord (included) to the "AC OUTLET" of the amplifier or the household AC outlet (AC 120 V/60 Hz).

FRONT PANEL CONTROLS AND FUNCTIONS



Control section

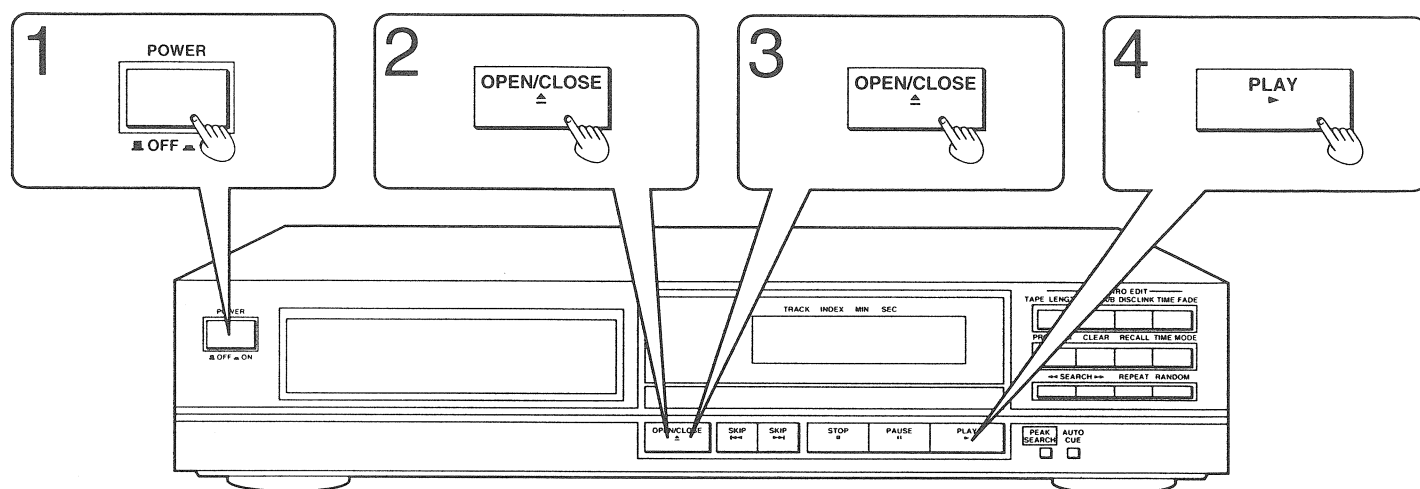
- | | |
|--|------------------------------------|
| ① Power switch (POWER) | ⑧ Stop button (■ STOP) |
| ② Disc tray | ⑨ Pause button (PAUSE) |
| ③ Buttons for program function | ⑩ Play button (▶ PLAY) |
| • Program button (PROGRAM) | ⑪ Search buttons (◀◀ SEARCH ▶▶) |
| • Clear button (CLEAR) | ⑫ Peak search button (PEAK SEARCH) |
| • Recall button (RECALL) | ⑬ Auto cue button (AUTO CUE) |
| ④ Buttons for CD-Edit function | ⑭ Repeat button (REPEAT) |
| • Tape length button (TAPE LENGTH) | ⑮ Random play button (RANDOM) |
| • Tape side select button (SIDE A/B) | |
| • Disc link button (DISC LINK) | |
| • Time fade button (TIME FADE) | |
| ⑤ Time mode select button (TIME MODE) | |
| ⑥ Disc tray open/close button (▲ OPEN/CLOSE) | |
| ⑦ Skip buttons (◀◀ SKIP, ▶▶ SKIP) | |



Display section

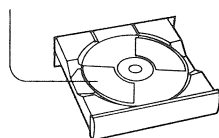
- | | |
|-----------------------------------|--|
| ①⑥ Disc link indicator (LINK) | ②⑤ Play indicator (▶) |
| ①⑦ Program indicator (PGM) | ②⑥ Pause indicator () |
| ①⑧ Track number display | ②⑦ Peak search indicator (PEAK) |
| ①⑨ Index/program sequence display | ②⑧ Compact disc edit indicator (EDIT) |
| ②⑩ Auto cue indicator (A.CUE) | ②⑨ Tape side indicator (→A, →B) |
| ②⑪ Time display | ③⑩ Track number indicator (1-16) |
| ②⑫ Repeat indicator (◁) | ③⑪ "Over" mark (➤) |
| ②⑬ A-B repeat indicator (A-B) | ③⑫ Time fade/fade out indicator (T FADE) |
| ②⑭ Random play indicator (RANDOM) | |

■ BASIC OPERATING PROCEDURE

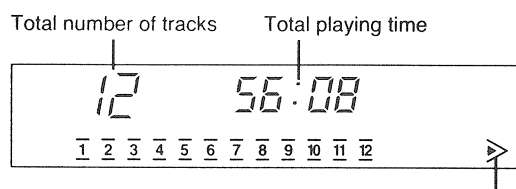


- 1 Press POWER to switch on the power.**
If there is a disc in the disc tray, play will start from the first track.
- 2 Press Δ OPEN/CLOSE to open the disc tray and insert a disc.**

Label must face upward.



- 3 Press Δ OPEN/CLOSE again to close the disc tray.**

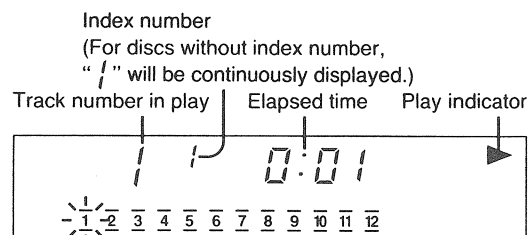


Lights when the total number of tracks exceeds 17

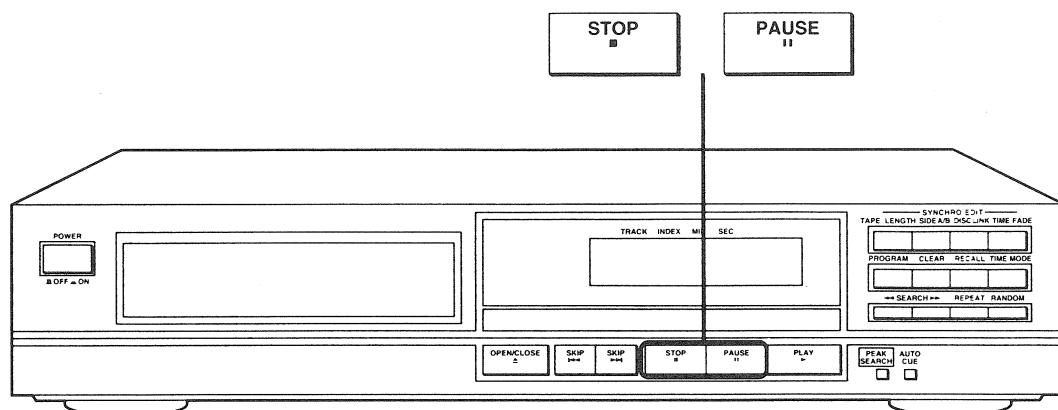
The total playing time displayed includes the silent sections between tracks. For this reason, it may be a few seconds longer than the playing time indicated on the disc.

You can skip this step and press **▶ PLAY**. The disc tray will be automatically closed and then play will start from the first track.

- 4 Press **▶ PLAY**.**

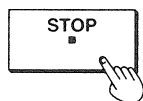


The unit stops automatically when the last track finishes playing.



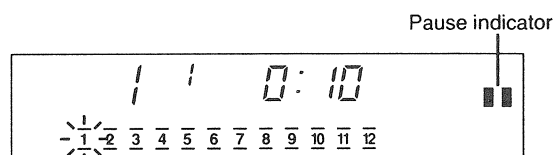
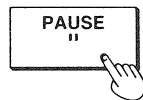
To stop disc play

Press ■ STOP.



To temporarily stop disc play

Press ▯ PAUSE.



Press ► PLAY to resume play.

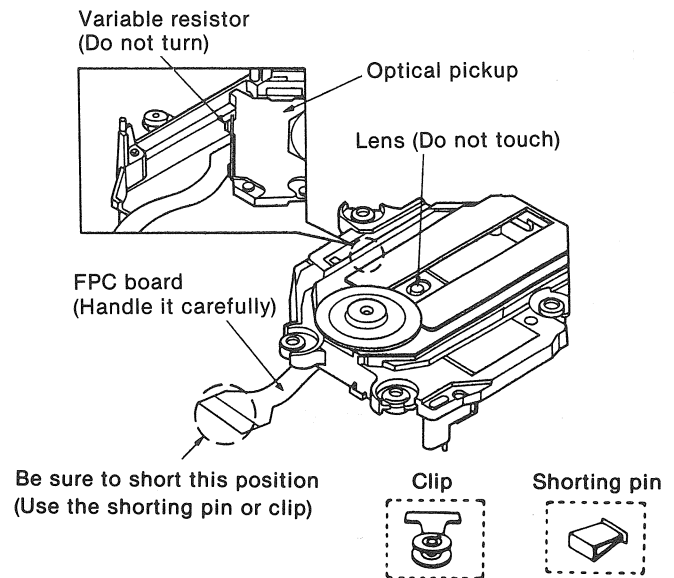
HANDLING PRECAUTIONS FOR TRAVERSE DECK

The laser diode in the traverse deck (optical pickup) may break down due to potential difference caused by static electricity of clothes or human body.

So, be careful of electrostatic breakdown during repair of the traverse deck (optical pickup).

• Handling of traverse deck (optical pickup)

1. Do not subject the traverse deck (optical pickup) to static electricity as it is extremely sensitive to electrical shock.
2. To prevent the breakdown of the laser diode, an antistatic shorting pin is inserted into the flexible board (FPC board).
When removing or connecting the short pin, finish the job in as short time as possible.
3. Take care not to apply excessive stress to the flexible board (FPC board).
4. Do not turn the variable resistor (laser power adjustment). It has already been adjusted.

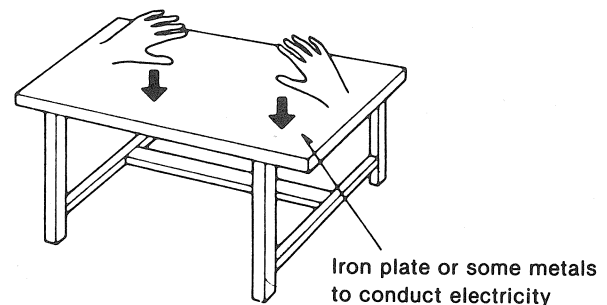
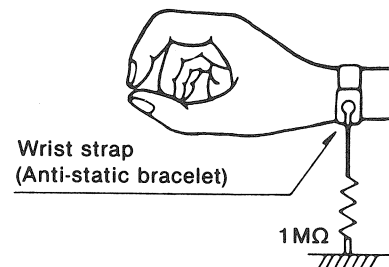


• Grounding for electrostatic breakdown prevention

1. **Human body grounding**
Use the anti-static wrist strap to discharge the static electricity from your body.
2. **Work table grounding**
Put a conductive material (sheet) or steel sheet on the area where the optical pickup is placed, and ground the sheet.

Caution:

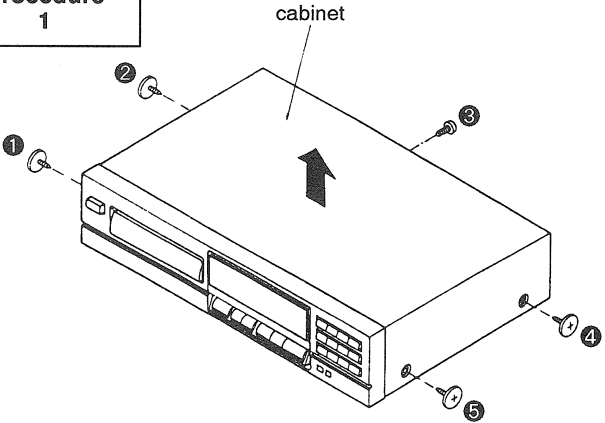
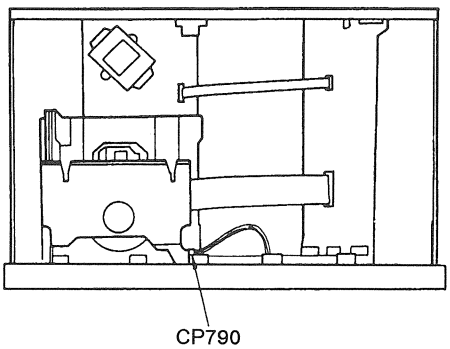
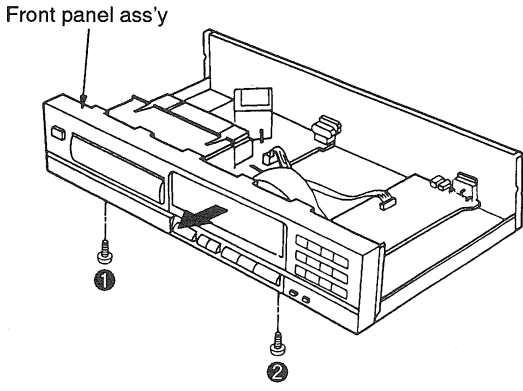
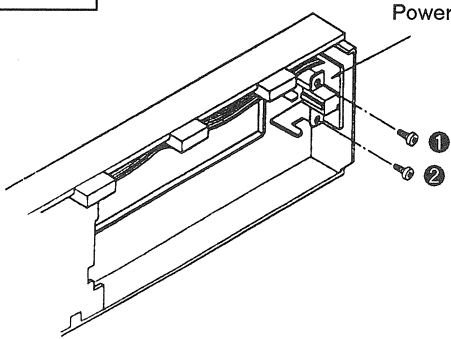
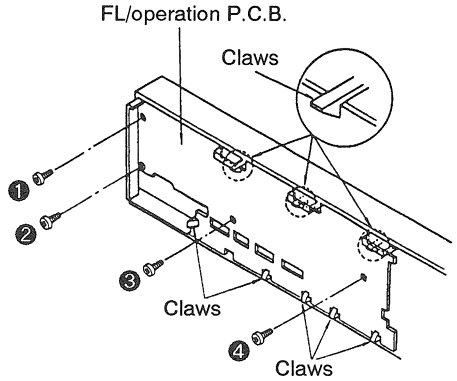
The static electricity of your clothes will not be grounded through the wrist strap. So, take care not to let your clothes touch the traverse deck (optical pickup).

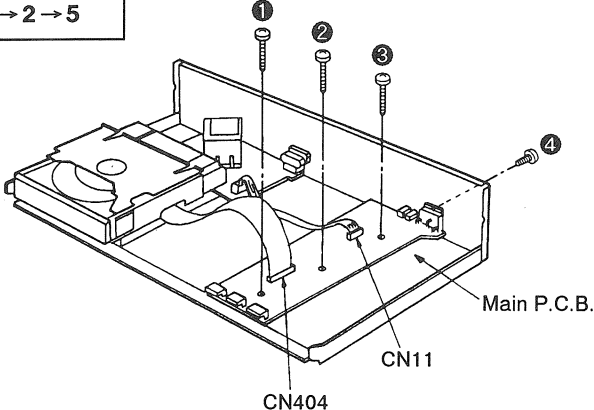
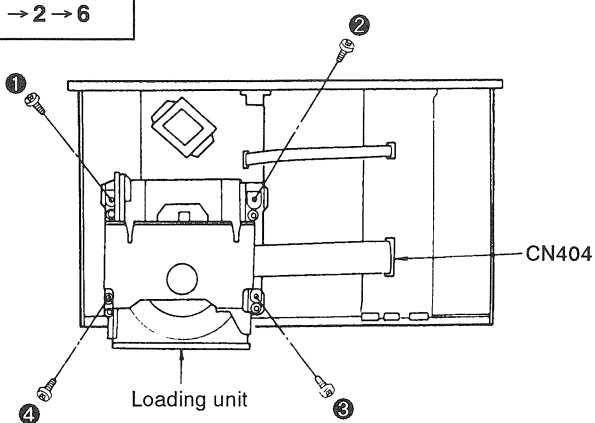
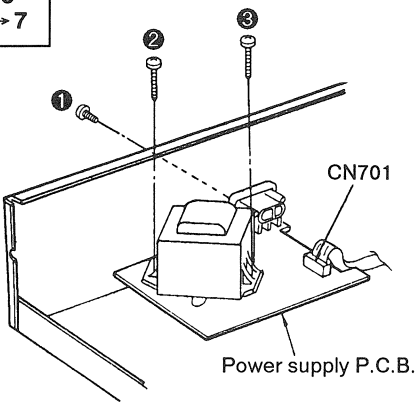
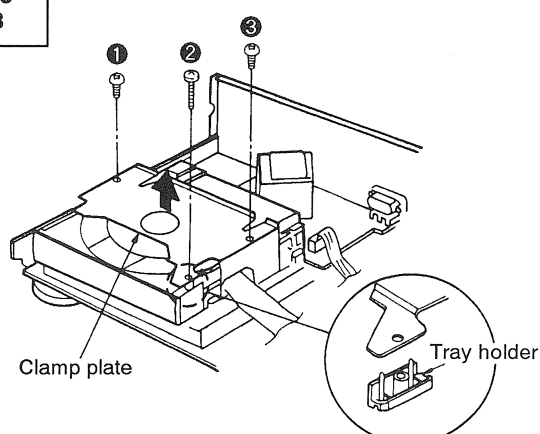
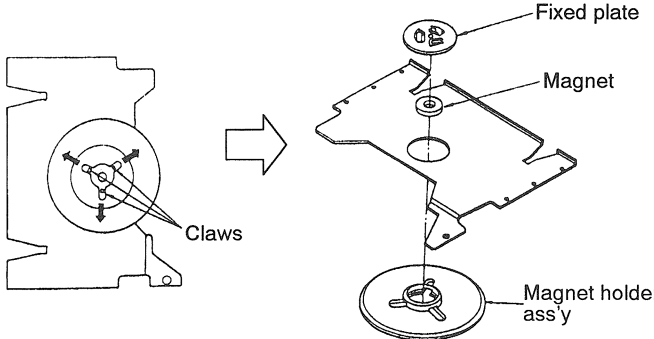
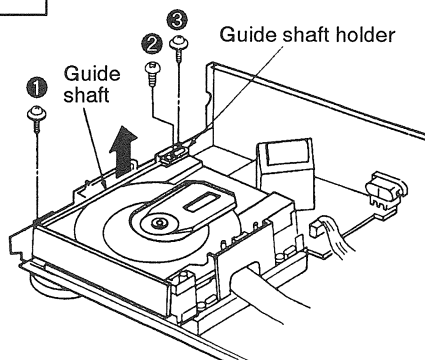


DISASSEMBLY INSTRUCTION

Warning: This product uses a laser diode. Refer to caution statements on page 2.

※ This CD player is equipped with FPC board so handle them with care during disassembly and reassembly.

Ref.No. 1	Removal of the cabinet	Ref.No. 2	Removal of the front panel ass'y
Procedure 1	 1. Remove the 5 screws(❶ ~ ❺).	Procedure 1 → 2	 1. Remove the 1 connector(CP790).
Ref.No. 3	Removal of the power switch P.C.B.		 2. Remove the 2 screws(❶, ❷). 3. Remove the front panel ass'y in the direction of arrow.
Procedure 1 → 2 → 3	 • Remove the 2 screws(❶, ❷).		
Ref.No. 4	Removal of the FL/operation P.C.B.		
Procedure 1 → 2 → 4	1. Remove the 4 screws(❶ ~ ❹). 2. Release the 8 claws.		

Ref.No. 5	Removal of the main P.C.B.	Ref.No. 6	Removal of the loading unit
Procedure 1 → 2 → 5	 1. Remove the 1 flat cable(CN11). 2. Remove the 1 connector(CN404). 3. Remove the 4 screws(① ~ ④).	Procedure 1 → 2 → 6	 1. Remove the 1 connector(CN404). 2. Remove the 4 screws(① ~ ④).
Ref.No. 7	Removal of the power supply P.C.B.	Ref.No. 8	Removal of the clamp plate
Procedure 1 → 2 → 6 → 7	 1. Remove the 1 flat cable(CN701). 2. Remove the 3 screws(① ~ ③).	Procedure 1 → 2 → 8	 1. Remove the 3 screws(① ~ ③). 2. Remove the clamp plate in the direction of arrow. 3. Remove the tray holder.
Ref.No. 9	Removal of the fixed plate, magnet and magnet holder ass'y	Ref.No. 10	Removal of the guide shaft and guide shaft holder
Procedure 1 → 2 → 8 → 9	 • Release the 3 claws.	Procedure 1 → 2 → 8 → 10	 1. Remove the 3 screws(① ~ ③). 2. Remove the guide shaft and guide shaft holder in the direction of arrow.

Ref.No. 11	Removal of the disc tray	1. Push the 2 levers in the direction of arrow ① until the traverse deck unit goes down and the disc tray slightly in the direction of arrow ②. 2. Remove the disc tray in the direction of arrow ③.	
Ref.No. 12	Removal of the servo P.C.B.	4. Remove the FPC board(CN701). Note: Insert a shorting pin into the traverse unit flexible cable. (Refer to "handling precautions for traverse deck" on page 7.)	
Ref.No. 13	Removal of the loading motor P.C.B. and loading motor ass'y	1. Remove the belt. 2. Remove the 2 screws(①, ②). 3. Remove the 1 screw(③). 4. Unsolder the loading motor terminals(2 points).	

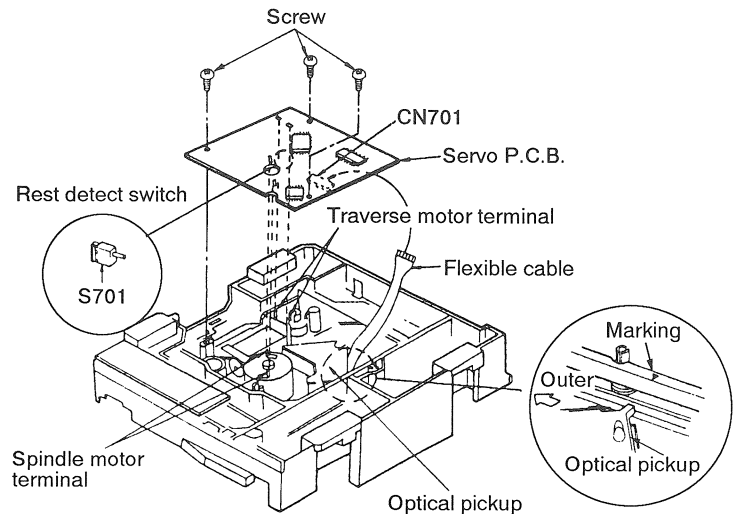
Ref.No. 14	Removal of the traverse deck unit		
Procedure 1 → 2 → 6 → 12 → 14	1. Widen the boss by using a regular screwdriver or similar object. 2. Pull out the pin in the direction of arrow. Boss Pin	 Traverse deck unit Claw	
1. Remove the 3 pins.		2. Release the claw and then remove the traverse deck unit in the direction of arrow.	
Ref.No. 15	Removal of the lock lever	Ref.No. 16	Removal of the conversion lever
Procedure 1 → 2 → 6 → 8 → 10 → 11 → 15	 Lock lever Lock lever spring [Back side] Claw	Procedure 1 → 2 → 6 → 8 → 10 → 11 → 12 → 14 → 15 → 16	 Slide plate(1) Claw(A) Assistance spring Conversion lever
1. Remove the lock lever spring. 2. Release the claw in the direction of arrow ①, and then remove the lock lever in the direction of arrow ②.		1. Remove the assistance spring. 2. Push the claw(A) in the direction of arrow ①, and then move the slide plate(1) in the direction of arrow ②. 3. Remove the conversion lever in the direction of arrow ③.	
Ref.No. 17	Removal of the traverse chassis		
Procedure 1 → 2 → 6 → 8 → 10 → 11 → 12 → 14 → 15 → 16 → 17	 Slide plate(1) Claw(A)	 Traverse chassis Claws(B)	
1. Push the claw(A) in the direction of arrow ①, and then move the slide plate(1) in the direction of arrow ②.		2. Push the 2 claws(B) in the direction of arrow ③, and then remove the traverse chassis.	

Ref.No. 18	Removal of the slide plate(1) and slide plate(2)	■ Removal of the slide plate(1) • Move the slide plate(1) in the direction of arrow ①, and remove the slide plate(1) in the direction of arrow ②. ■ Removal of the slide plate(2) • Move the slide plate(2) in the direction of arrow ③, and remove the slide plate(2) in the direction of arrow ④.
Ref.No. 19	How to check the servo P.C.B.	1. Install the front panel ass'y to the unit. 2. Connect the connector(CN404, CP790) to the main P.C.B. 3. Turn on the power switch, and then push the OPEN/CLOSE switch to open the disc tray. 4. Place the test disc on the disc tray, and then push OPEN/CLOSE switch to close the disc tray. 5. Place the loading unit sideways as shown above. 6. When checking the solder surface of the servo P.C.B., do as shown above.
Ref.No. 20	How to check the main P.C.B.	1. Remove the 4 screws(①~④). 2. Connect the connector(CP790) of the FL/operation P.C.B. 3. Place the main P.C.B. vertically, and then install FL/operation P.C.B. to the main P.C.B. 4. Connect the ground terminal(Output terminal) to the chassis with lead wire. 5. When checking the soldered surfaces of the main P.C.B. do as shown above.

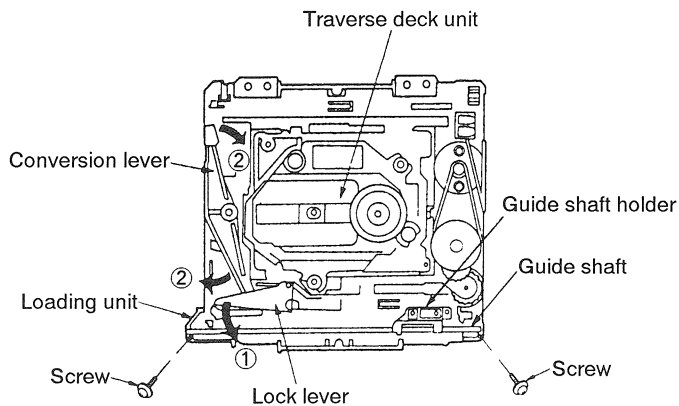
■ INSTALLING SERVO P.C.B.

1. Before installing the servo P.C.B., move the optical pickup toward the outer edge from the mark "▲".
[Otherwise, the rest detect switch(S701) mounted on the servo P.C.B. may be damaged.]
2. Connect the flexible cable to the connector(CN701).
3. Install the servo P.C.B. in the traverse deck unit with the three screws.
4. Solder the two terminals of the traverse motor and the two terminals of the spindle motor.

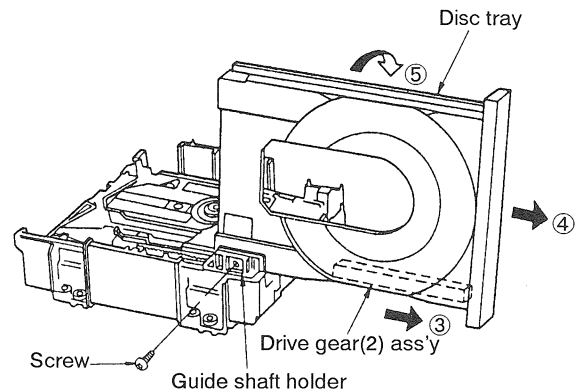
Note: Connect the flexible cable to the connector (CN701) firmly.
Tighten the screws before soldering the terminals.



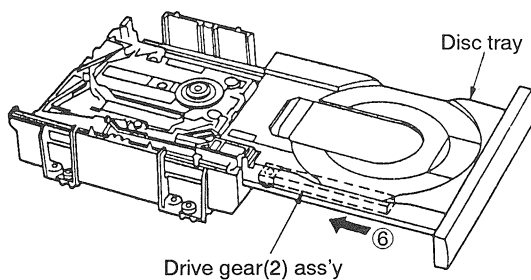
■ INSTALLING DISC TRAY



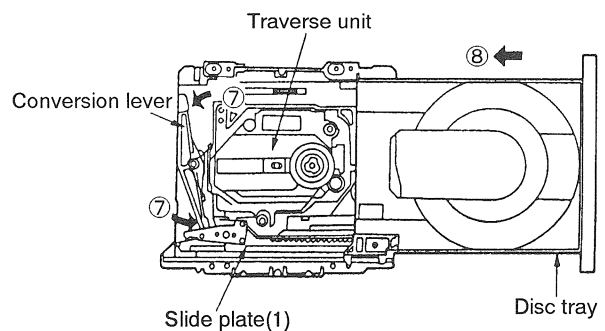
1. Move lock lever in the direction of arrow ① and conversion lever in the direction of arrow ②.
(Traverse deck unit rises.)
2. Install the guide shaft on the loading unit.



3. Install the disc tray on the guide shaft holder with the screws as shown above.
4. Slide the drive gear(2) ass'y fully in the direction of arrow ③.
5. Slide the disc tray fully in the direction of arrow ④.
6. Lay the disc tray down in the direction of arrow ⑤.



7. Slide the drive gear(2) ass'y in the direction of arrow ⑥.
8. Hold the disc tray and slide the under tray fully the direction of arrow ⑥.
[Slide but very little and the drive gear is engaged with drive gear(2) ass'y.]



9. Slide the conversion lever fully in the direction of arrow ⑦, and the drive gear(2) ass'y engages with the slide plate(1).
(The traverse deck unit is lowered.)
10. Slide the disc tray in the direction of arrow ⑧.

■ DISPLAY FUNCTION OF AUTOMATICALLY-ADJUSTED RESULTS (SELF-CHECK FUNCTION)

The unit contains a function which displays the result of the automatically adjustment of the servo circuits (tracking, focus servo, etc.) as an error code on the FL display.

The error code display serves as a repair guide showing the automatically adjustment circuit is at fault. The procedures for displaying the error codes are given below.

• Procedures to display the error code

1. Press the [POWER] key to turn the unit ON. Next, press the [OPEN/CLOSE (▲)] key to open the disc tray, load the test disc (SZZP1054C) on the tray, close the tray by pressing the [OPEN/CLOSE (▲)] key again, and finally press the [POWER] key to turn the unit OFF.
2. While simultaneously pressing and holding the three keys, [TAPE LENGTH], [PROGRAM], and [◀◀ SEARCH (B)], press the [POWER] key again. When the unit is turned on and the FL display is lit up, immediately release the three keys. An error code will appear on the FL display (e.g. "E-0").
3. The error code provides a rough indication of which servo circuit is malfunctioning.

• Error code based troubleshooting

※ The unit is satisfactory if the error code is E-0 of E-2.

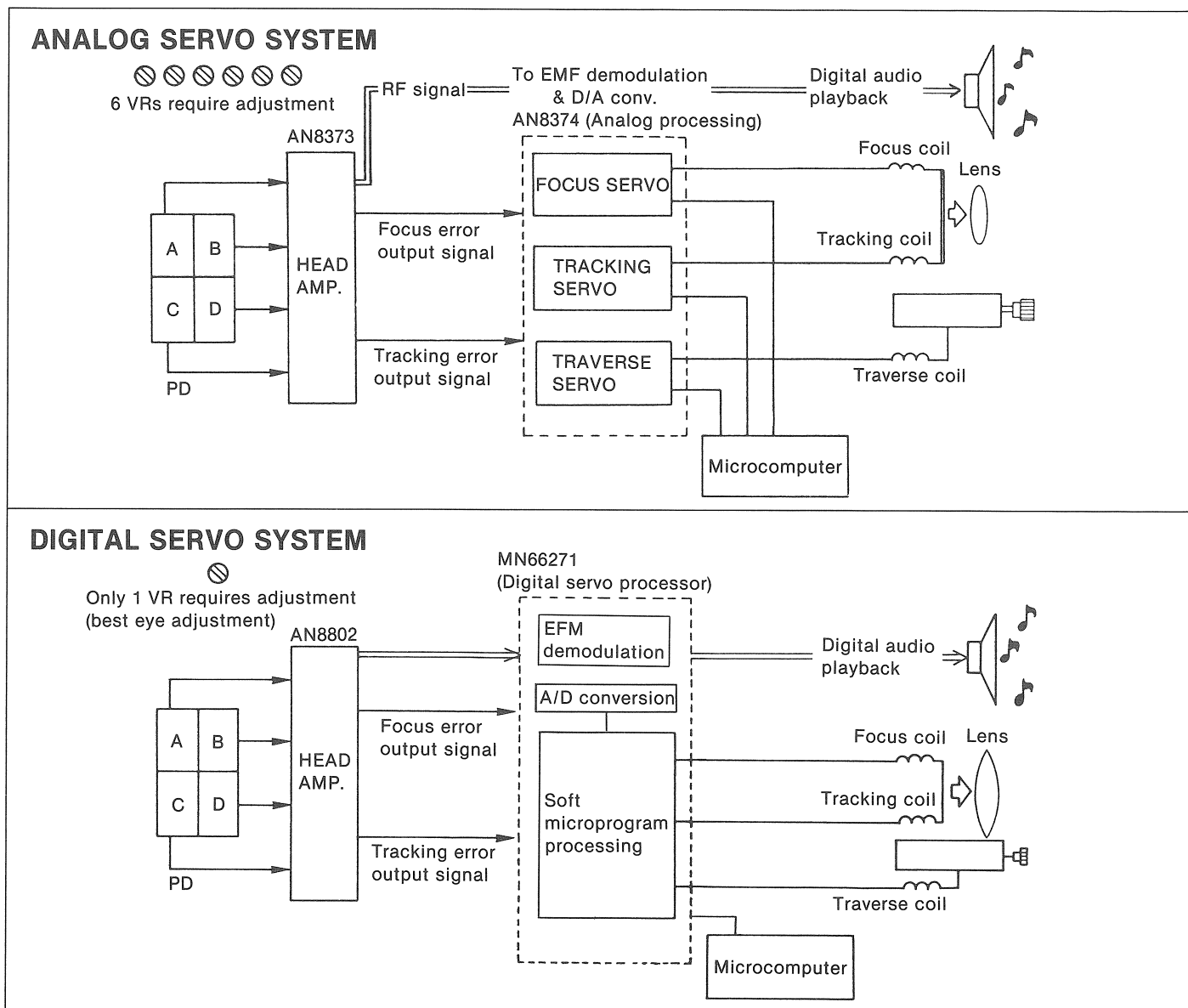
※ Before testing, check that the test disc is free of scratches and dirt and optical pickup is clean.

FL error code display	Symptom	Probable cause	Signal to check		Normal the values of voltage and waveform	
			Signal name	Location	PLAY	STOP
E-1	Focus and tracking offset adjustments did not complete in the specified time period.	① Clocks X1 and X2, power supply VDD, and reset/RST, all on IC702 ② MDATA, MCLK, MLD, and SENSE signals to/from the mechanism controller	MDATA	IC702 ⑧ pin		4.8V
			MCLK	IC702 ⑦ pin		4.8V
			MLD	IC702 ⑨ pin		
			SENSE	IC702 ⑩ pin	0V	0V
			/RST	IC702 ⑬ pin	4.9V	4.9V
			X1	IC702 ⑤⑧ pin		
E-3 E-5 E-7 E-9 E-B E-D E-F	Disc play unstable	① Scratches or contaminants on disc surface ② Focus and tracking servo circuits (check waveforms, voltages, and part constants.) ③ Spindle driver circuit ④ Optical pickup	X2	IC702 ⑤⑨ pin		
			FE	IC702 ③② pin		2.4V
			TE	IC702 ③③ pin		2.4V
			FOD	IC702 ②⑧ pin	2.4V	2.4V
			TRD	IC702 ②⑦ pin	2.4V	2.4V
			KICK	IC702 ②⑥ pin	2.4V	2.4V
			/FLOCK	IC702 ①① pin	0V	4.9V
			/RF DET	IC702 ③⑧ pin	0V	4.8V
			RF	TJ701		3.4V
E-4 E-6	Focus gain adjustment did not complete in the specified time period.	① Scratches or contaminants on disc surface ② Focus servo circuit (check waveforms, voltages, and part constants.) ③ Optical pickup	STAT	IC702 ①⑦ pin	4.9V	0V
			FE	IC702 ③② pin		2.4V
			OFT	IC702 ③⑥ pin	0V	0V
E-8 E-A	Tracking gain adjustment did not complete in the specified time period.	① Scratches or contaminants on disc surface ② Tracking circuit (check waveforms, voltages, and part constants.) ③ Optical pickup	/TLOCK	IC702 ①② pin	0V	0V
			TE	IC702 ③③ pin		2.4V
			OFT	IC702 ③⑥ pin	0V	0V
E-C E-E	Perform the same check as for error codes <E4, E6> and <E8, A>.		/TLOCK	IC702 ①② pin	0V	0V
			FE	IC702 ③② pin		2.4V
			TE	IC702 ③③ pin		2.4V
			OFT	IC702 ③⑥ pin	0V	0V

DIGITAL SERVO SYSTEM

The newly-developed digital servo system is adopted in the servo circuit of the unit's CD player instead of the ordinary analog servo system.

- The diagrams shown below represent differences between the analog servo and digital servo systems. The HEAD AMP. output signals (i.e., focus error and tracking error output signals) are analog. These analog signals are converted to the 8-bit digital signals through the MN66271. The MN66271 performs the following adjustments automatically; focus offset, tracking offset, focus gain, tracking gain, and tracking balance adjustments. The outputs from the MN66271 such as the focus coil driving signal, tracking coil driving signal, and traverse motor driving signal are converted to analog signals again and sent to the coils and motor to perform proper servo control for a disc.



Renewed Digital Servo Circuit

The SL-PG440 employs a renewed digital servo circuit. This new circuit has the following improvements over the former circuit:

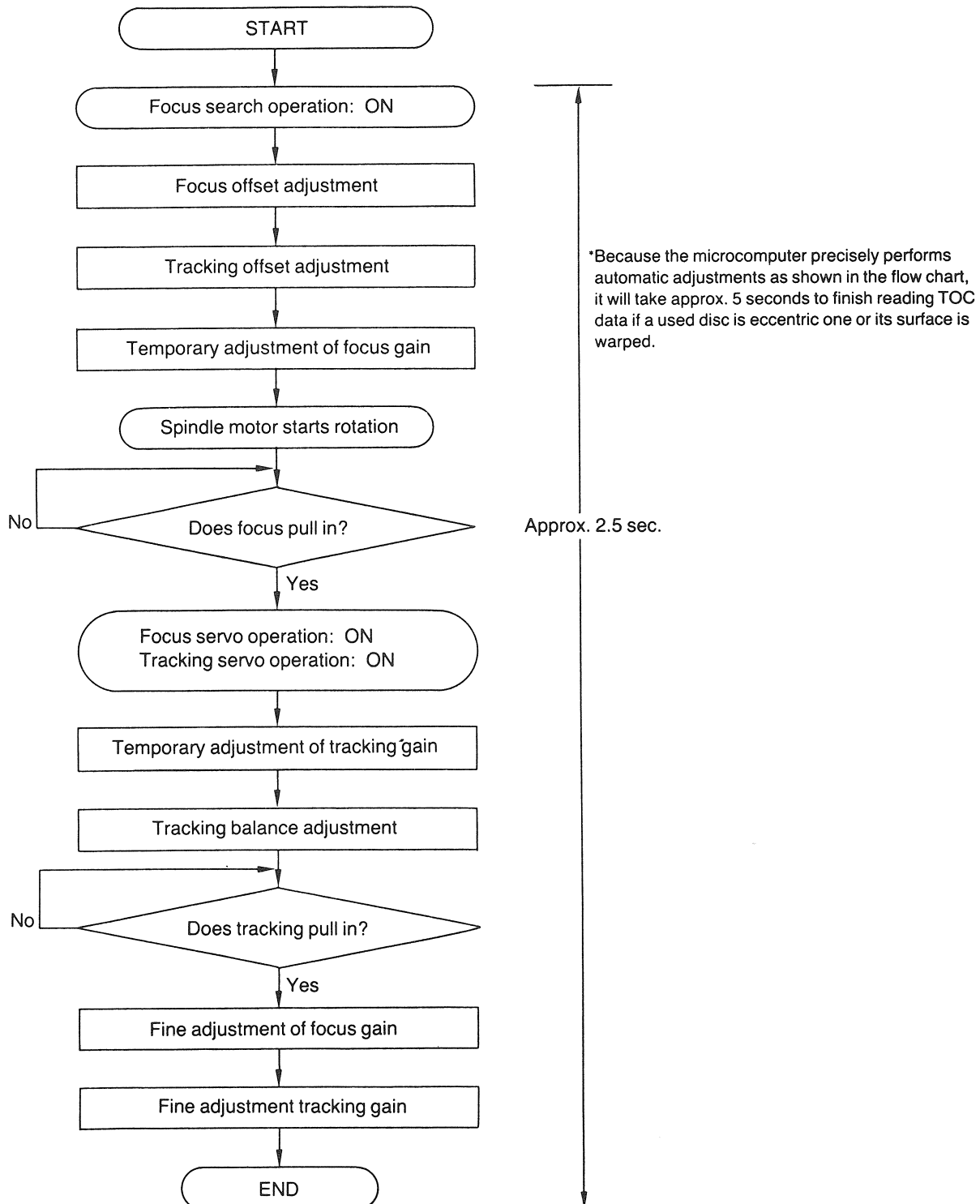
- **Reduced operation noise:**
A double-stage noise reduction system is employed in the loading mechanism.
- **Shortened access time (from 2.9sec. to 1.9sec.)**
The traverse gears have been improved.

- **Improved vibration resistance:**
The double floating head mechanism uses rubber and spring mountings.
 $f_0 = 50\text{ Hz (former)} \rightarrow 20\text{ Hz (new)}$
- **Reduced component count:**
Three ICs used in the former model were integrated into a single chip.
Former model: MN6626, MN6650, AN8800
 $\rightarrow$ New model: MN66271

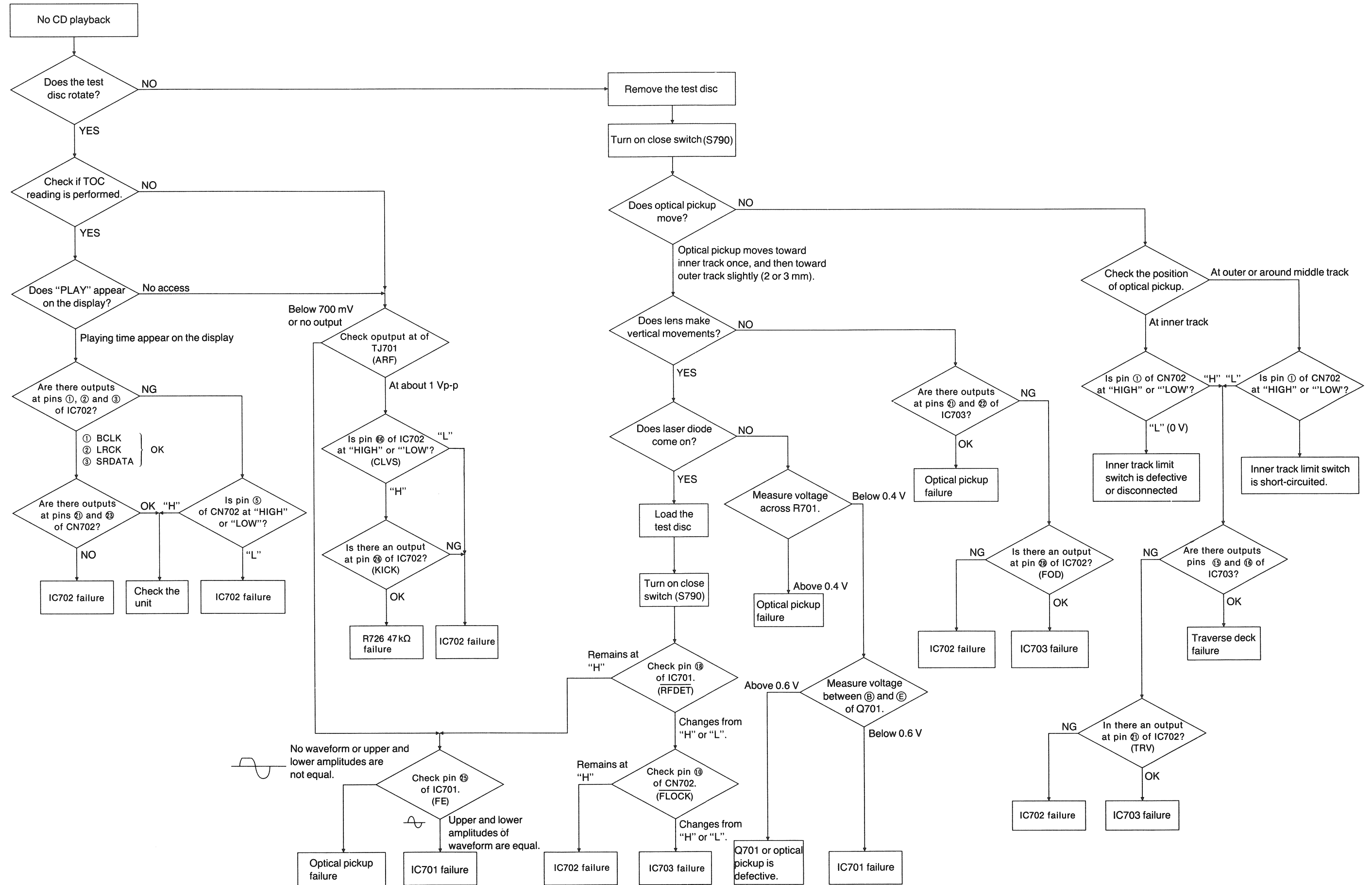
2. The servo processor IC (MN66271) of the newly-developed digital servo circuit automatically performs the following adjustments which were originally adjusted manually in the conventional analog servo circuit:
 (1) Focus offset, (2) Tracking offset, (3) Focus gain, (4) Tracking gain, and (5) Tracking balance. Therefore, you do not have to perform the above-mentioned electrical adjustments. The unit optimizes the servo for each loaded disc. [You must perform the best eye (PD balance) adjustment manually.]

The following flow chart shows the sequence of automatic adjustments.

• **Flow chart on automatic adjustment sequence**



TROUBLESHOOTING GUIDE



MEASUREMENTS AND ADJUSTMENTS

Warning: This product uses a laser diode. Refer to caution statements on page 2.

Measuring Instruments and Special Tools

- * Test discs
 1. Playability test disc (SZZP1054C)
 2. Uneven test disc (SZZP1056C)
- * Musical program disc (ordinary)
- * Dual-beam oscilloscope with bandwidth of 30MHz or better (with EXT. trigger and 1:1 probe).
- * Allen wrench (M2.0) (SZZP1101C)
- * Lock paint (RZZOL01)

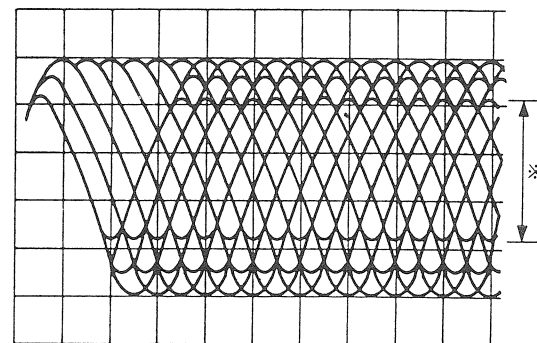
(1) MECHANICAL ADJUSTMENT

- When the traverse deck is replaced, making adjustments is not necessary. (The traverse deck ass'y is already adjusted.)
- Make adjustments to improve playability if the traverse deck has not been replaced.

1. Connect the oscilloscope's CH. 1 probe across **TJ701** (RF) (+) and **TJ702** (VREF) (–) on the servo P.C.B.

Oscilloscope setting: VOLT 200mV
SWEEP 0.5μs.
Input coupling AC

2. Switch the player power **ON**, and play track 19 on the test disc (SZZP1056C). (Playing any other track will prevent, the HEX screws from being accessed.)
3. Leave the player in play mode and place the traverse deck as shown under Ref. No. 20 on page 12.
4. Alternately adjust the HEX screws with the 2.0mm allen wrench (SZZP1101C) until the vertical fluctuation of RF signal is minimized and the eye pattern is most stretched. (Refer to Fig. 2 on page 20)
5. After completing the adjustment, lock the HEX screws with lock paint (RZZOL01).



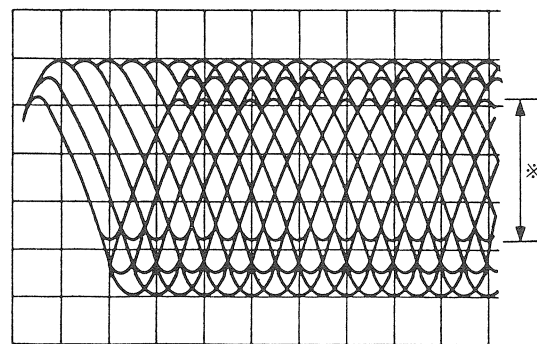
* Most stretched eye pattern.

(2) BEST EYE (PD BALANCE) ADJUSTMENT

1. Connect the oscilloscope's CH. 1 probe across **TJ701** (RF) (+) and **TJ702** (VREF) (–) on the servo P.C.B.

Oscilloscope setting: VOLT 200mV
SWEEP 0.5μs.
Input coupling AC

2. Switch the player power **ON**, and play the 1kHz (track 1) on the test disc (SZZP1054C).
3. Adjust **VR701** until the vertical fluctuation of RF signal is minimized and the eye pattern is most stretched. (Refer to Fig. 1 on page 20)



* Most stretched eye pattern.

(3) CHECK OF PLAY OPERATION AFTER ADJUSTMENT

* Checking Skip Search

1. Play an ordinary musical program disc.
2. Press the skip button to check for normal skip search operation (in both the forward and reverse directions).

* Checking Manual Search

1. Play an ordinary musical program disc.
2. Press the manual search button to check for smooth manual search operations at either low or high speed (in both the forward and reverse directions).

* Checking Playability

1. Play the 0.7mm black dot and the 0.7mm wedge on the test disc (SZZP1054C) and verify that no sound skip or noise occurs.
2. Play the middle tracks of the uneven test disc (SZZP1056C) and verify that no sound skip or noise occurs.

• Adjustment points

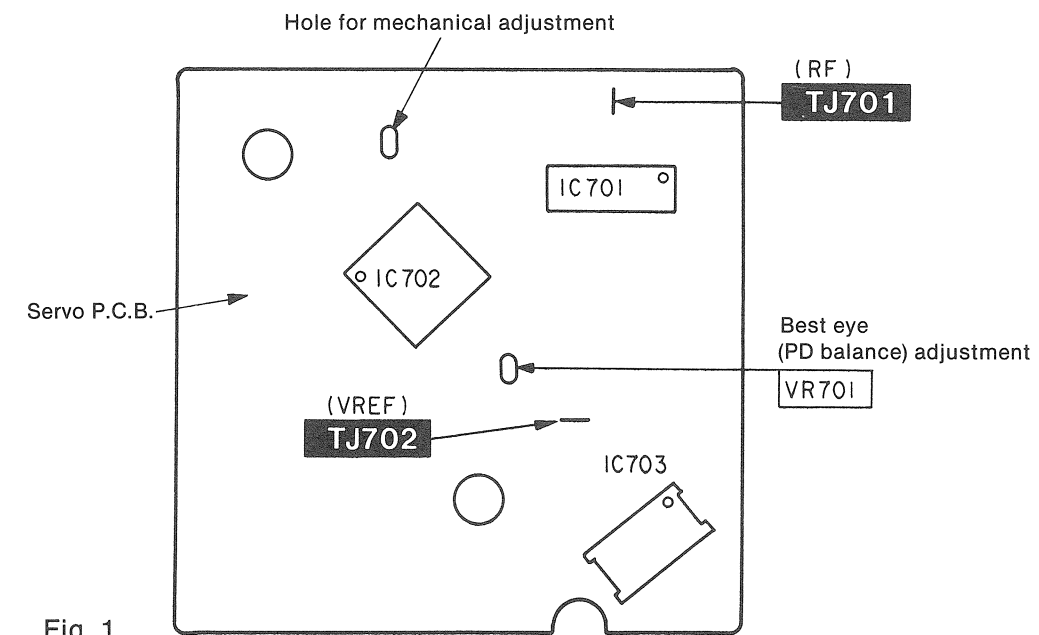


Fig. 1

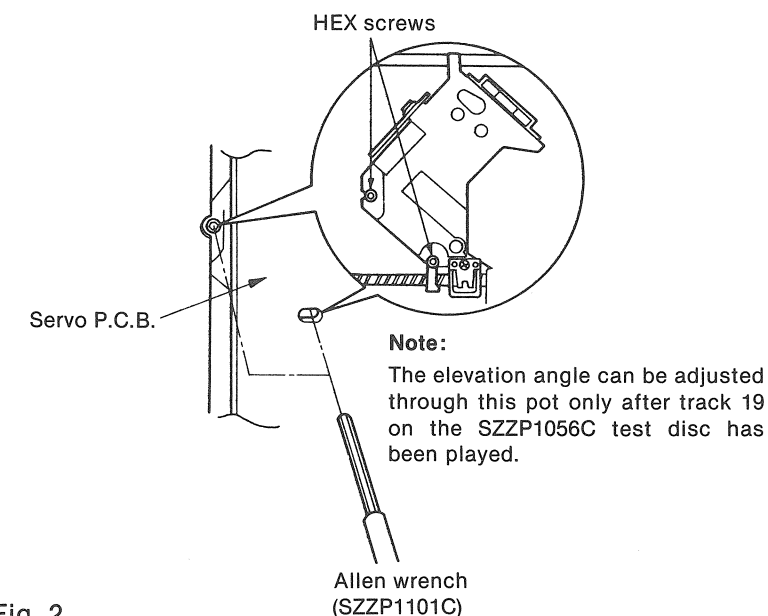


Fig. 2

■ TERMINAL FUNCTION OF IC'S

• IC601 (MN187164PKZ1): System control & FL drive

Pin No.	Mark	I/O Division	Function
1	V _{DD}	I	Power supply terminal
2	OSC2	I	Clock input terminal (4.2336 MHz)
3	OSC1	O	
4	V _{SS}	—	GND terminal
5	XI	—	(Not used, connected to GND)
6	XO	—	(Not used, open)
7	P27 (OPEN)	O	Loading motor “open” command signal
8	P26 (CLOSE)	O	Loading motor “close” command signal
9	P25 (OPEN SW)	I	Disc holder “open” detection
10	P24 (CLOSE SW)	I	Disc holder “close” detection
11	P23 (REST SW)	I	Rest position detection signal
12	P22	—	(Not used, open)
13	P21 (SYNC. R)	O	Synchro record control signal
14	P20 (REC. E)	I	
15	P15 (REMOCON)	I	Remote control signal
16	P14 (SENSE)	I	Optical servo condition (track cross) input
17	P13 (FLOCK)	I	Optical servo condition (focus) input

Pin No.	Mark	I/O Division	Function
18	P12 (TLOCK)	I	Optical servo condition (tracking) input
19	P11 (D MUTE)	O	Muting output
20	P10 (STAT)	I	Status signal (CRC, CUE, CLVS, TTSTOP, FCLV, SQOK)
21	P7 (RST)	I	Reset signal input
22	P5 (MCLK)	O	Command clock signal
23	P4 (MLD)	O	Command load signal (“L”: LOAD)
24	P3 (MDATA)	O	Command data signal
25	P2 (SQCK)	O	Sub-code Q register clock
26	P1 (SUBQ)	I	Sub-code Q data
27	P0 (BLKCK)	I	Sub-code block clock (f=75 Hz)
28	SYNC	—	(Not used, open)
29	CM	—	(Not used, connected to GND)
30 └ 37	P47 └ P40	I	Key return signal
38 └ 47	D9 └ D0	O	FL digit signal
48 └ 63	S15 └ S0	O	FL segment signal and key scan signal
64	V _{PP}	I	Power supply terminal of FL display

• IC702 (MN66271RA): Digital servo processor/digital signal processor/digital filter/D/A converter

Pin No.	Mark	I/O Division	Function
1	BCLK	O	Serial bit clock terminal
2	LRCK	O	L/R discriminating signal
3	SRDATA	O	Serial data (Not used, open)
4	DV _{DD} 1	I	Power supply (digital circuit) terminal
5	DV _{SS} 1	—	GND (digital circuit) terminal
6	TX	O	Digital audio interface signal
7	MCLK	I	Command clock signal
8	MDATA	I	Command data signal
9	MLD	I	Command load signal ("L": LOAD)
10	SENSE	O	Sense signal (OFT, FESL, NACEND, NAJEND, POSAD, SFG)
11	/FLOCK	O	Optical servo condition (focus) ("L": lead-in)
12	/TLOCK	O	Optical servo condition (tracking) ("L": lead-in)
13	BLKCK	O	Sub-code block clock (f=75Hz)
14	SQCK	I	Sub-code Q register clock
15	SUBQ	O	Sub-code Q data
16	DMUTE	I	Muting input ("H": MUTE)
17	STAT	O	Status signal (CRC, CUE, CLVS, TTSTOP, FCLV, SQCK)
18	/RST	I	Reset signal ("L": reset)
19	SMCK	O	System clock (f=4.2336MHz)
20	PMCK	O	Frequency division clock signal (Not used, open) $(f = \frac{1}{1.92} \times ck = 88.2kHz)$
21	TRV	O	Traverse servo control

Pin No.	Mark	I/O Division	Function
22	TVD	O	Traverse drive signal
23	PC	O	Turntable motor drive signal ("L": ON)
24	ECM	O	Turntable motor drive signal (Forced mode)
25	ECS	O	Turntable motor drive signal (Servo error signal)
26	KICK	O	Kick pulse output
27	TRD	O	Tracking drive signal output
28	FOD	O	Focus drive signal output
29	VREF	I	D/A drive output (TVD, ECS, TRD, FOD, FBAL, TBAL) normal voltage input terminal
30	FBAL	O	Focus balance adj. output
31	TBAL	O	Tracking balance adj. output
32	FE	I	Focus error signal (analog input)
33	TE	I	Tracking error signal (analog input)
34	RFENV	I	RF envelope signal
35	VDET	I	Oscillation det. signal ("H": det.)
36	OFT	I	Off track signal ("H": Off track)
37	TRCRS	I	Track cross signal input
38	/RFDET	I	RF detection signal ("L": detection)
39	BDO	I	Dropout detection signal ("H": dropout)
40	LDON	O	Laser power control ("H": ON)
41	TES	O	Tracking error shunt output ("H": dropout)
42	PLAY	O	Play signal ("H": play)

Pin No.	Mark	I/O Division	Function
43	WVEL	O	Double velocity status signal ("H": double)
44	ARF	I	RF signal input
45	IREF	I	Reference current input
46	DRF	I	DSL bias terminal (Not used, open)
47	DSL F	I/O	DSL loop filter terminal
48	PLL F	I/O	PLL loop filter terminal
49	VCO F	I/O	VCO loop filter terminal (Not used, open)
50	AV _{DD} 2	I	Power supply (analog circuit) terminal (2)
51	AV _{SS} 2	—	GND (analog circuit) terminal
52	EFM	O	EFM signal (Not used, open)
53	PCK	O	PLL extract clock (f=4.3218MHz)
54	PDO	O	Phase compared signal of EFM and PCK (Not used, open)
55	SUBC	O	Sub-code serial output data (Not used, open)
56	SBCK	I	Sub-code serial output clock (Not used, open)
57	V _{SS}	—	GND terminal
58	X1	I	Crystal oscillator terminal (f=16.9344MHz)
59	X2	O	
60	V _{DD}	I	Power supply terminal
61	BYTCK	O	Byte clock signal
62	/CLDCK	O	Sub-code frame clock signal (f CLDCK=7.35kHz: Normal) (Not used, open)

Pin No.	Mark	I/O Division	Function
63	FCLK	O	Crystal frame clock (Not used, open)
64	IPFLAG	O	Interpolation flag terminal
65	FLAG	O	Flag terminal
66	CLVS	O	Turntable servo phase synchro signal ("H": CLV, "L": Rough servo)
67	CRC	O	Sub-code CRC check terminal ("H": OK, "L": NG)
68	DEMPH	O	De-emphasis ON signal ("H": ON)
69	RESY	O	Re-synchronizing signal of frame sync. (Not used, open)
70	/RST2	I	Reset terminal after "MASH" circuit
71	/TEST	I	Test terminal (Normal: "H")
72	AV _{DD} 1	I	Power supply (analog circuit) terminal (1)
73	OUTL	O	
74	AV _{SS} 1	—	GND (analog circuit) terminal (1)
75	OUTR	O	Rch audio signal
76	RSEL	I	Polarity direction control terminal of RF signal
77	CSEL	I	Frequency control terminal of crystal oscillator
78	PSEL	I	Test terminal (Normal: "L")
79	MSEL	I	"SMCK" terminal frequency select ("L": SMCK=4.2336MHz)
80	SSEL	I	"SUBQ" terminal mode select ("H": Q code buffer)

• IC701 (AN8802SCE1V): Servo amp

Pin No.	Mark	I/O Division	Function
1	PDAD	I	Photo detector Bch input without delay
2	PDA	I	Photo detector Ach input without delay
3	LPD	I	Laser PD signal
4	LD	O	Laser power auto control output
5	AMPI	I	RF amp terminal
6	V _{CC}	I	Power supply terminal
7	AMPO	O	RF amp signal
8	CAGC	I	AGC detection capacitor input
9	ARF	O	RF signal
10	CENV	I	RF detect capacitor connection terminal
11	CEA	I	HPF-AMP capacitor connection terminal
12	GND	—	GND terminal
13	LDON	I	LD APC ON/OFF ("H": ON, "L": OFF)
14	TES	I	Tracking error shunt input ("H": shunt)
15	PLAY	I	Play signal ("H": ON, "L": OFF)
16	WVEL	I	Double velocity ("H": double, "L": single)

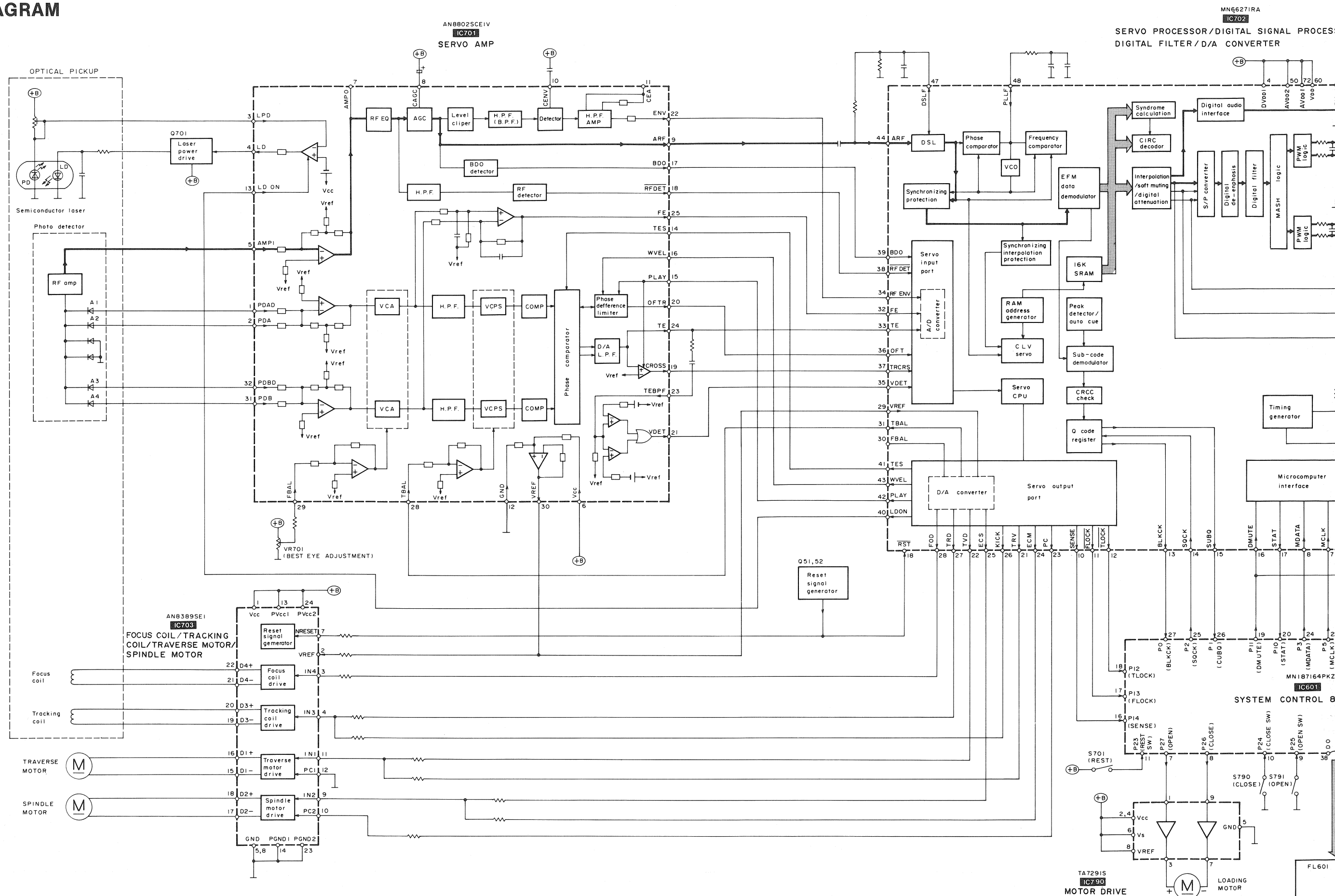
Pin No.	Mark	I/O Division	Function
17	BDO	O	Dropout detection control
18	/RFDET	O	RF det. signal ("L": det.)
19	CROSS	O	Tracking error zero cross output
20	OFTR	O	Off track detection ("H": det.)
21	VDET	O	Oscillation det. signal ("H": det.)
22	ENV	O	Envelope output terminal
23	TEBPF	I	Oscillation detect input terminal
24	TE	O	Tracking error signal
25	FE	O	Focusing error signal
26	PTO	O	Potention amp output
27	PTI	I	Potention amp input
28	TBAL	I	Tracking balance adj. input
29	FBAL	I	Focus balance adj. input
30	VREF	O	Reference voltage output
31	PDB	I	Photo detector Ach input with delay
32	PDBD	I	Photo detector Bch input with delay

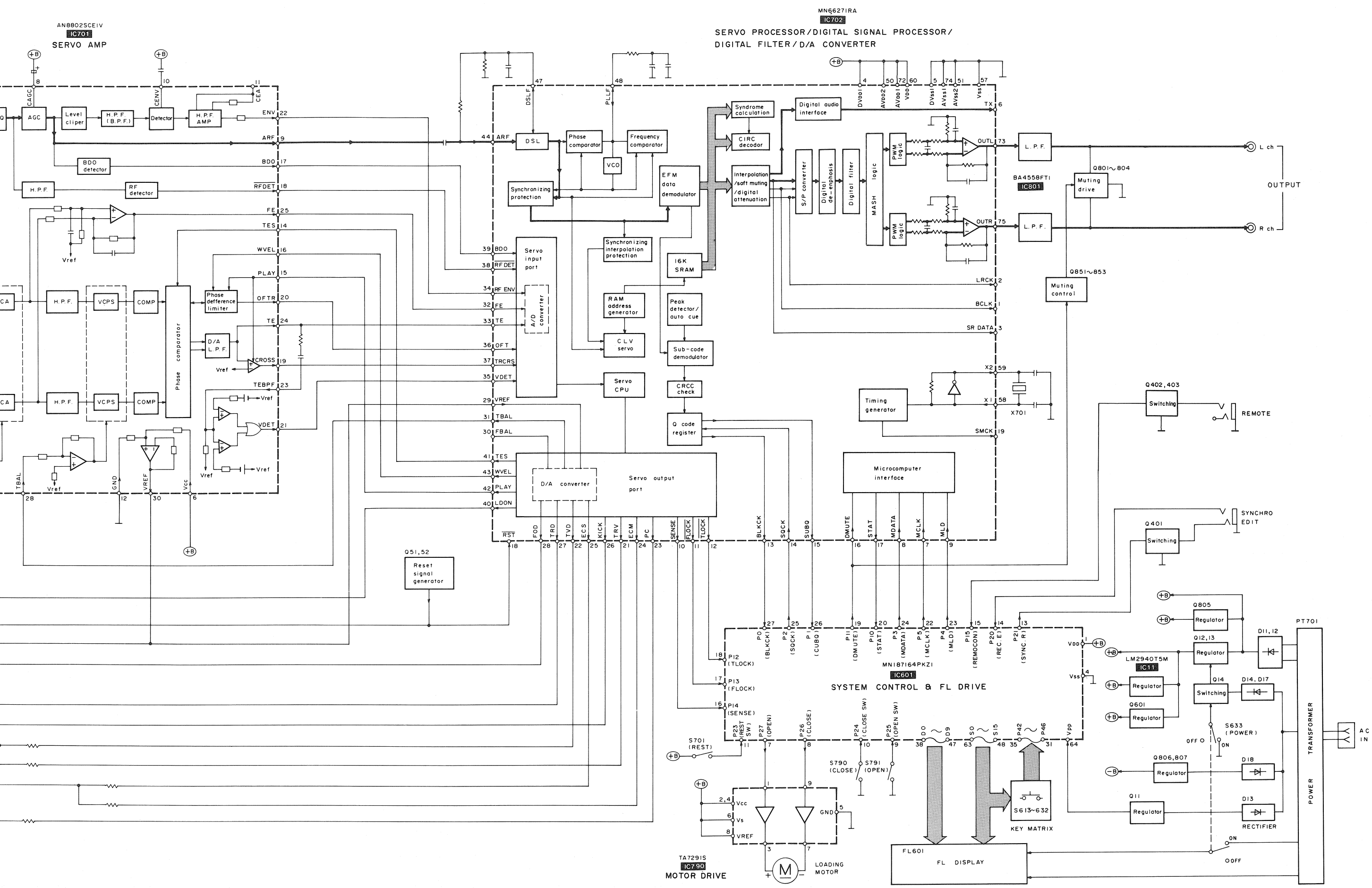
• IC703 (AN8389SE1): Focus coil/tracking coil/traverse motor/spindle motor drive

Pin No.	Mark	I/O Division	Function
1	V _{CC}	I	Power supply terminal
2	VREF	I	Reference voltage input
3	IN4	I	Motor driver (4) input
4	IN3	I	Motor driver (3) input
5	GND	—	GND terminal
6	NC	—	No connection
7	NRESET	I	Reset terminal
8	GND	—	GND terminal
9	IN2	I	Motor driver (2) input
10	PC2	I	PC2 (power cut) input
11	IN1	I	Motor driver (1) input
12	PC1	I	PC1 (power cut) input (Not used, open)

Pin No.	Mark	I/O Division	Function
13	PV _{CC} 1	I	Driver power supply (1)
14	PGND1	—	Driver GND terminal (1)
15	D1—	O	Motor driver (1) output terminal (—)
16	D1+	O	Motor driver (1) output terminal (+)
17	D2—	O	Motor driver (2) output terminal (—)
18	D2+	O	Motor driver (2) output terminal (+)
19	D3—	O	Motor driver (3) output terminal (—)
20	D3+	O	Motor driver (3) output terminal (+)
21	D4—	O	Motor driver (4) output terminal (—)
22	D4+	O	Motor driver (4) output terminal (+)
23	PGND2	—	Driver GND terminal (2)
24	PV _{CC} 2	I	Driver power supply (2)

BLOCK DIAGRAM





Note:
→ : Audio signal

■ SCHEMATIC DIAGRAM (Parts list on pages 43~46)

(This schematic diagram may be modified at any time with development of new technology.)

Note:

- **S613** : Disc holder open/close (▲ OPEN/CLOSE) switch.
- **S614, 615** : Skip (SKIP) switches.
[S614: ◀◀, S615: ▶▶]
- **S616** : Stop (■ STOP) switch.
- **S617** : Pause (■ PAUSE) switch.
- **S618** : Play (▶ PLAY) switch.
- **S619** : Peak level search (PEAK SEARCH) switch.
- **S620** : Auto cue (AUTO CUE) switch.
- **S621** : Edit tape length (TAPE LENGTH) switch.
- **S622** : Tape side slect (SIDE A/B) switch
- **S623** : Disc link (DISC LINK) switch.
- **S624** : Time fade (TIME FADE) switch.
- **S625** : Program (PROGRAM) switch.
- **S626** : Clear (CLEAR) switch.
- **S627** : Recall (RECALL) switch.
- **S628** : Time mode (TIME MODE) switch.
- **S629, 630** : Search (SEARCH) switches.
[S629: ◀◀, S630: ▶▶]
- **S631** : Repeat (REPEAT) switch.
- **S632** : Random (RANDOM) switch.
- **S633** : Power (POWER) switch.
- **S701** : Rest detector in "OFF" position.
(It turns "ON" when optical pickup comes to innermost periphery.)
- **S790** : Disc holder "close" detector switch.
- **S791** : Disc holder "open" detector switch.
- The voltage value and waveforms are the reference voltage of this unit measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis.

Accordingly, there may arise some error in voltage values and waveforms depending upon the internal impedance of the tester or the measuring unit.
* The parenthesized are the values of voltage generated during playing (Test disc 1 kHz, L + R, 0 dB), others are voltage values in stop mode.

Important safety notice:

- Components identified by △ mark have special characteristics important for safety. Furthermore, special parts which have purposes of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used. When replacing any of components, be sure to use only manufacturer's specified parts shown in the parts list.
- The supply parts number is described alone in the replacement parts.

Part No.	Original Part No.	Supply part No.
IC11	LM2940T5M	LM2940T5
IC801	BA4558FT1	SVIBA4558F

Signal line

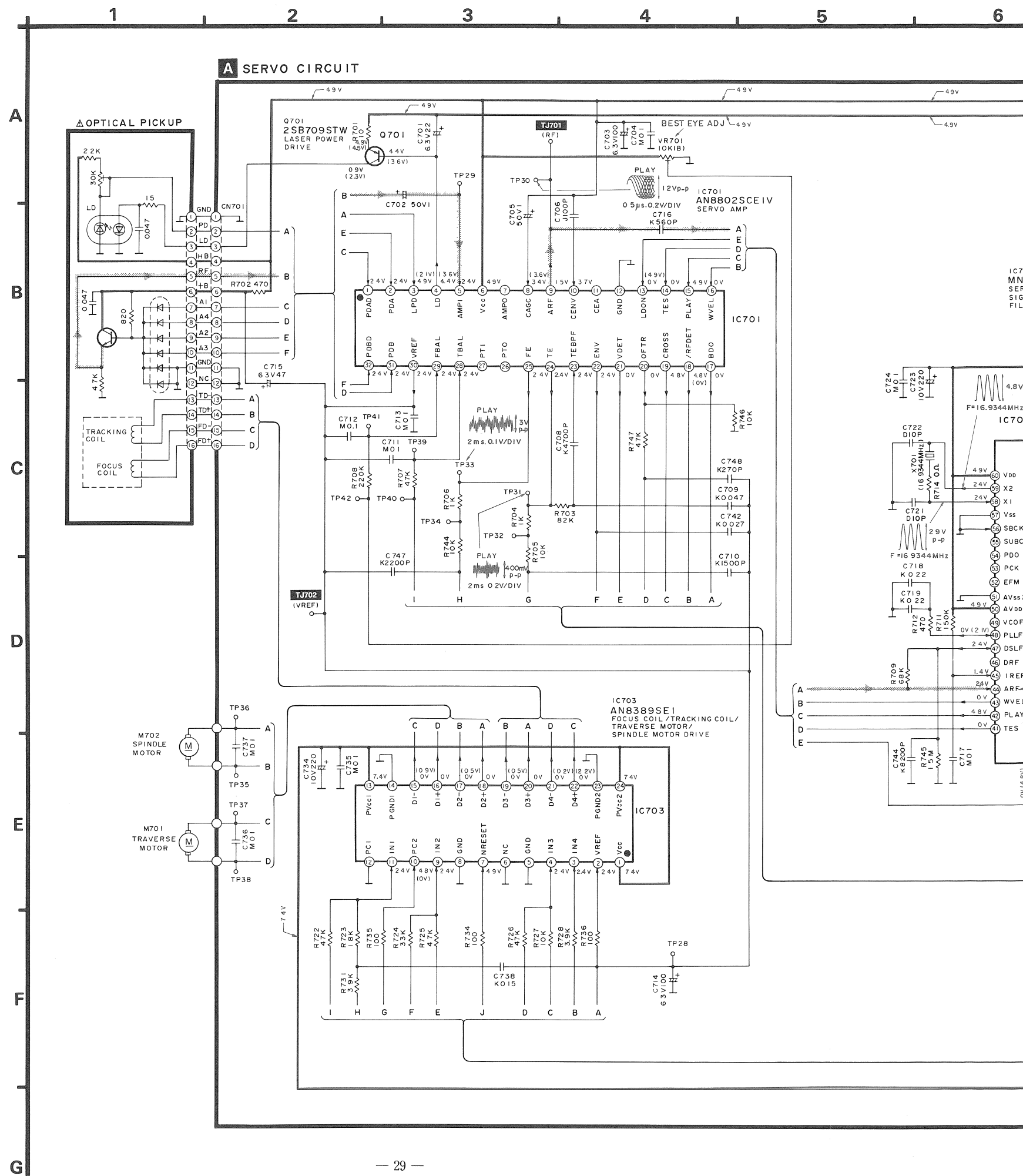
- / — : Positive voltage lines and negative voltage lines
- ⋯ : Audio signal line

Caution!

- IC and LSI are sensitive to static electricity. Secondary trouble can be prevented by taking care during repair.
- Cover the parts boxes made of plastics with aluminum foil.
- Ground the soldering iron.
- Put a conductive mat on the work table.
- Do not touch the pins of IC or LSI with fingers directly.

• Terminal guide of IC's, transistors and diodes

BA4558FT1 	AN8802SCE1V 	AN8389SE1 	MN66271RA 	TA7291S 	MN187164PKZ1
LM2940T5M 		2SA1309QRSTA 2SC3311QRSTA 2SD1450RSTTA UN4112TA UN4212TA	DTA114ESTP 	2SB1238QSTV6 	2SD2037EFTA
2SB709STW 	1SS254TA SVD1SR35200V 		MTZJ5R6BTA MTZJ8R2CTA MTZJ27DTA		



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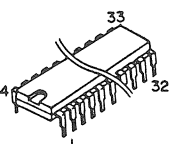
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care during

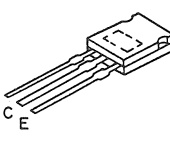
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MN187164PKZ1

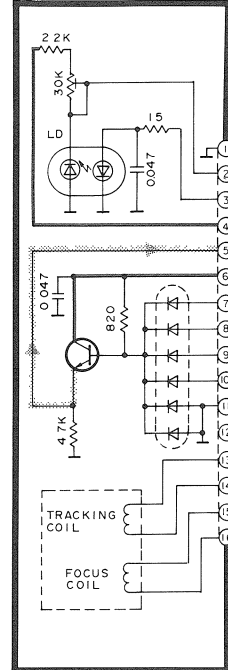


2SD2037EFTA



A SERVO CIRCUIT

OPTICAL PICKUP



M702
SPINDLE
MOTOR

M701
TRAVERSE
MOTOR

MN187164PKZ1

2SD2037EFTA

2SD2037EFTA

2SD2037EFTA

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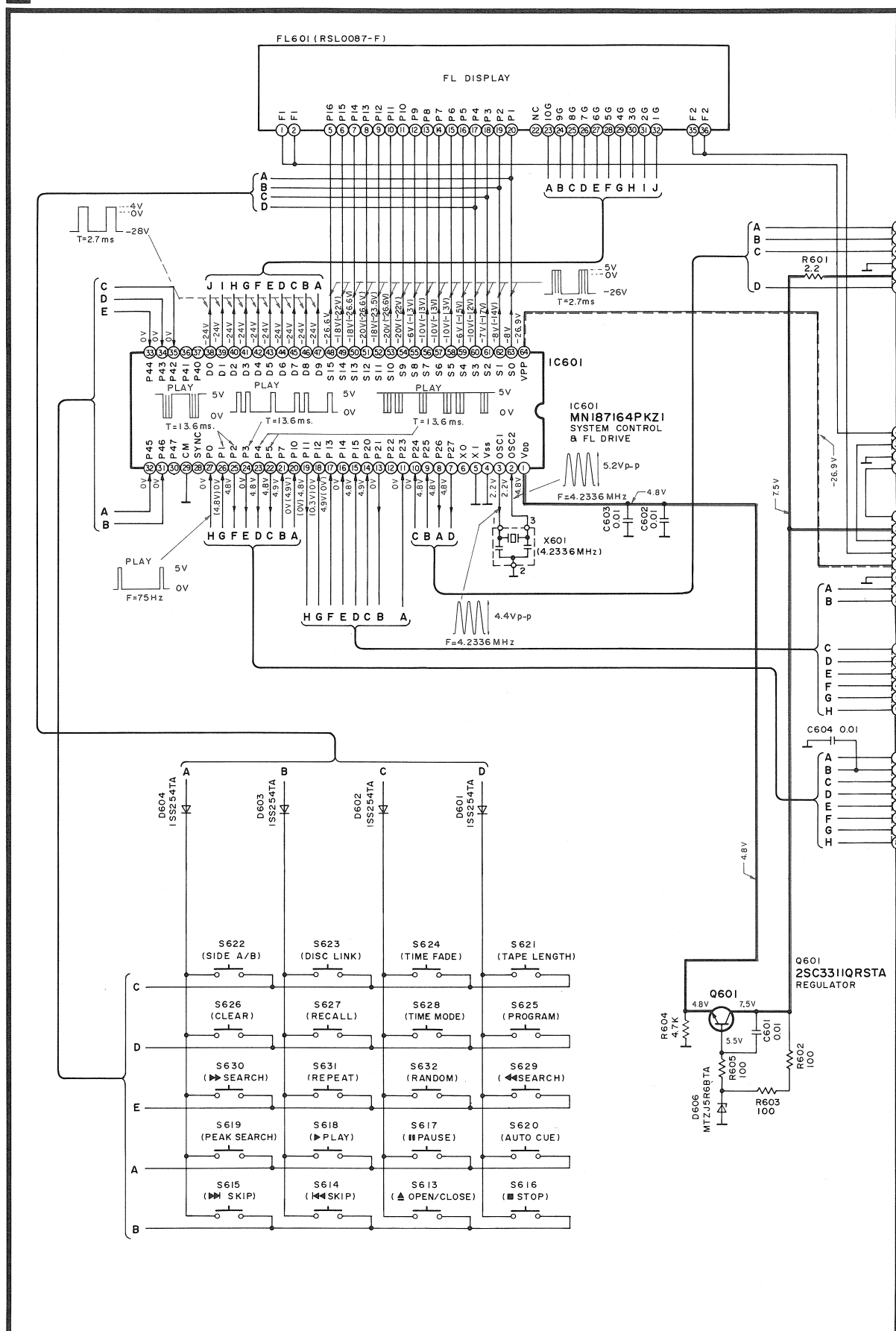
2SD2037EFTA

IC702
MN66271RA
SERVO PROCESSOR/DIGITAL
SIGNAL PROCESSOR/DIGITAL
FILTER/D/A CONVERTER

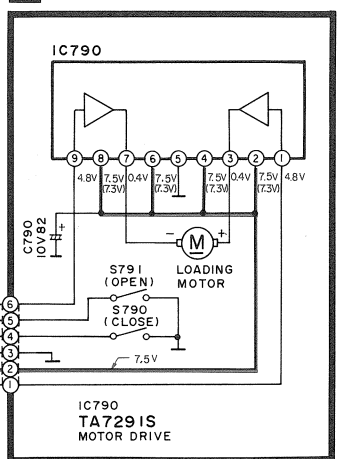
IC703
AN8389SE1
FOCUS COIL/TRACKING COIL/
TRAVERSE MOTOR/
SPINDLE MOTOR DRIVE

TO MAIN
CIRCUIT
(CN404)

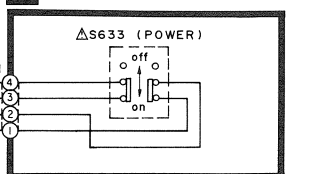
B FL/OPERATION CIRCUIT



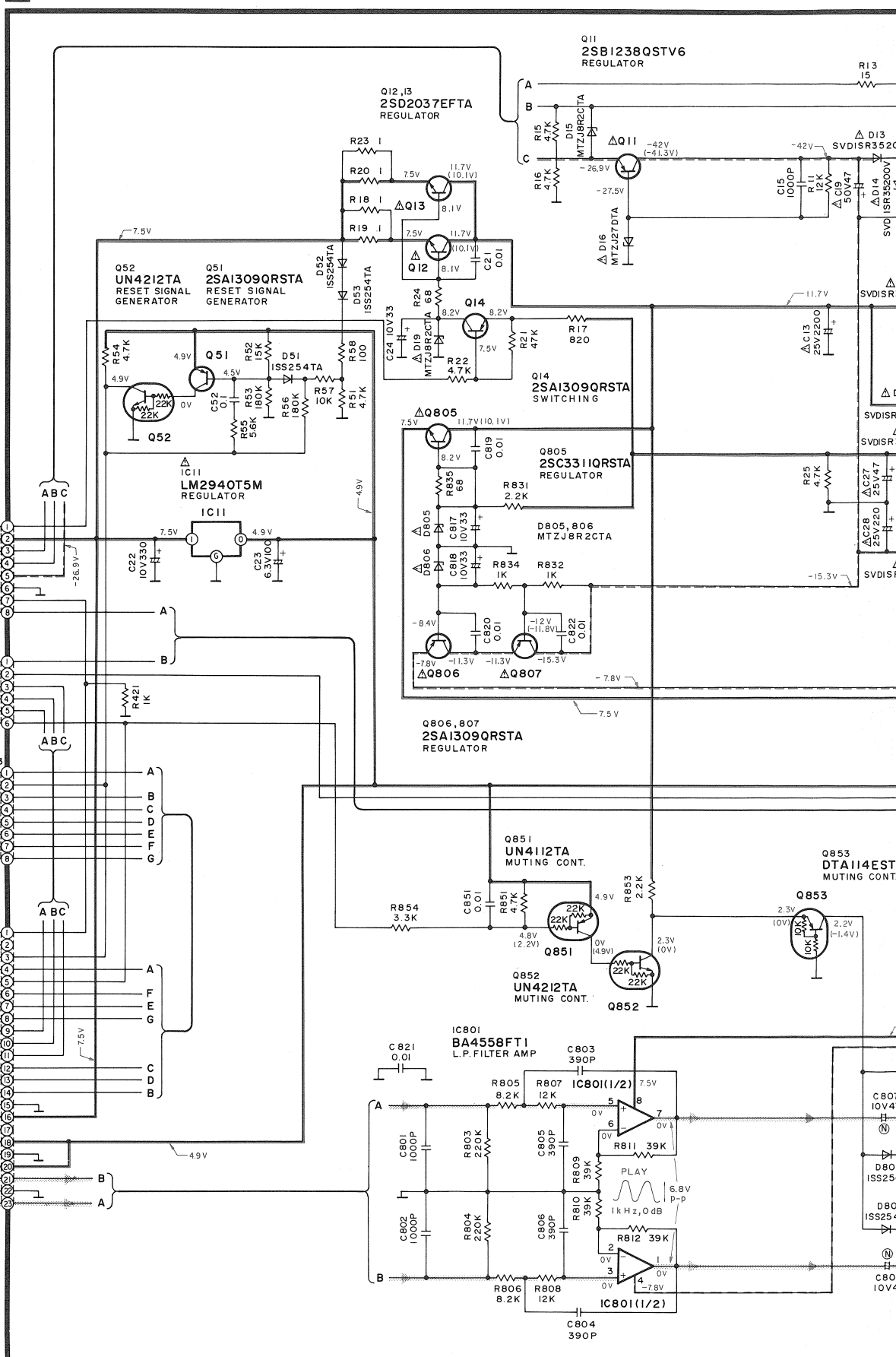
C LOADING MOTOR CIRCUIT



D POWER SWITCH CIRCUIT



E MAIN CIRCUIT

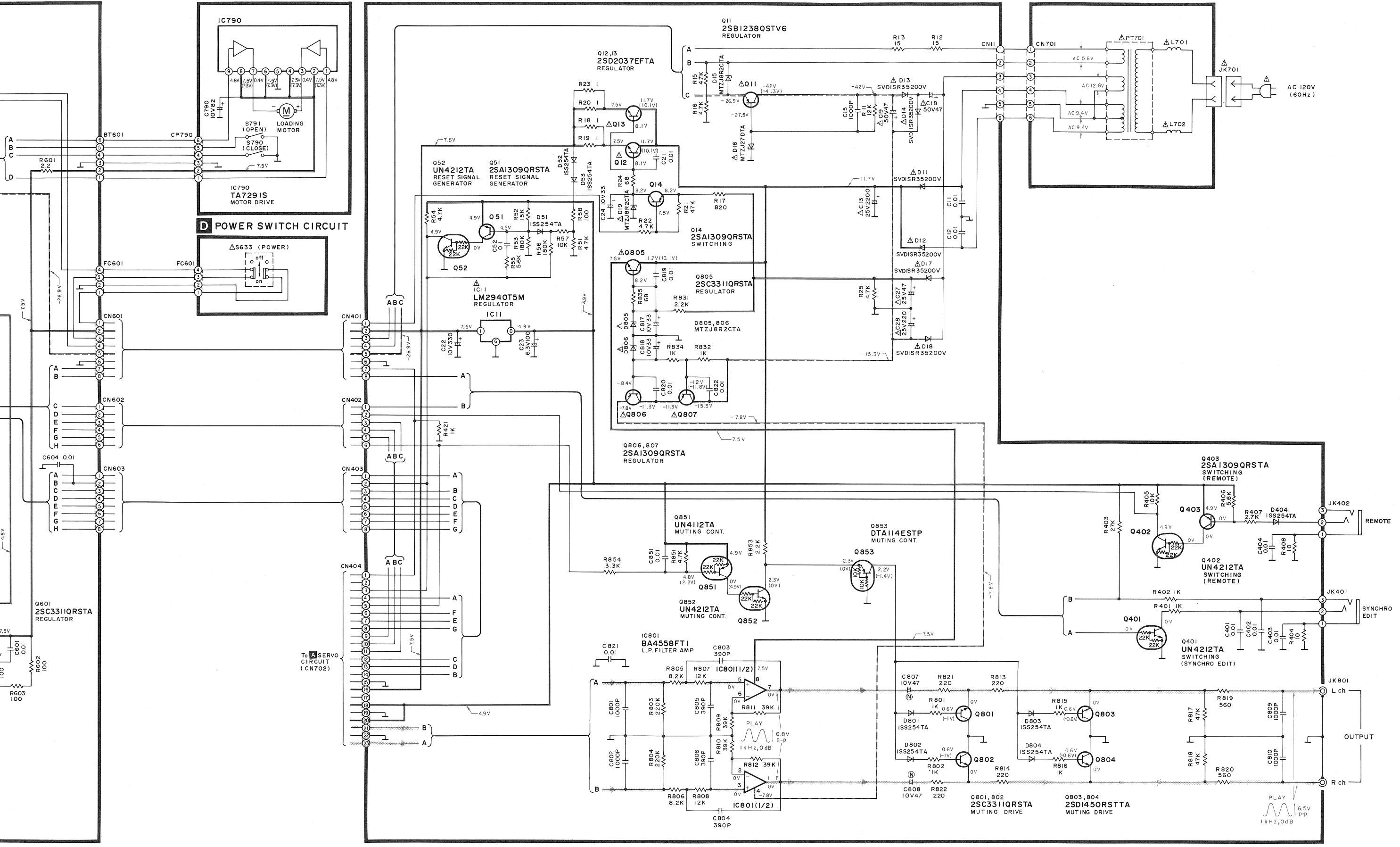


15 16 17 18 19 20 21 22 23 24

C LOADING MOTOR CIRCUIT

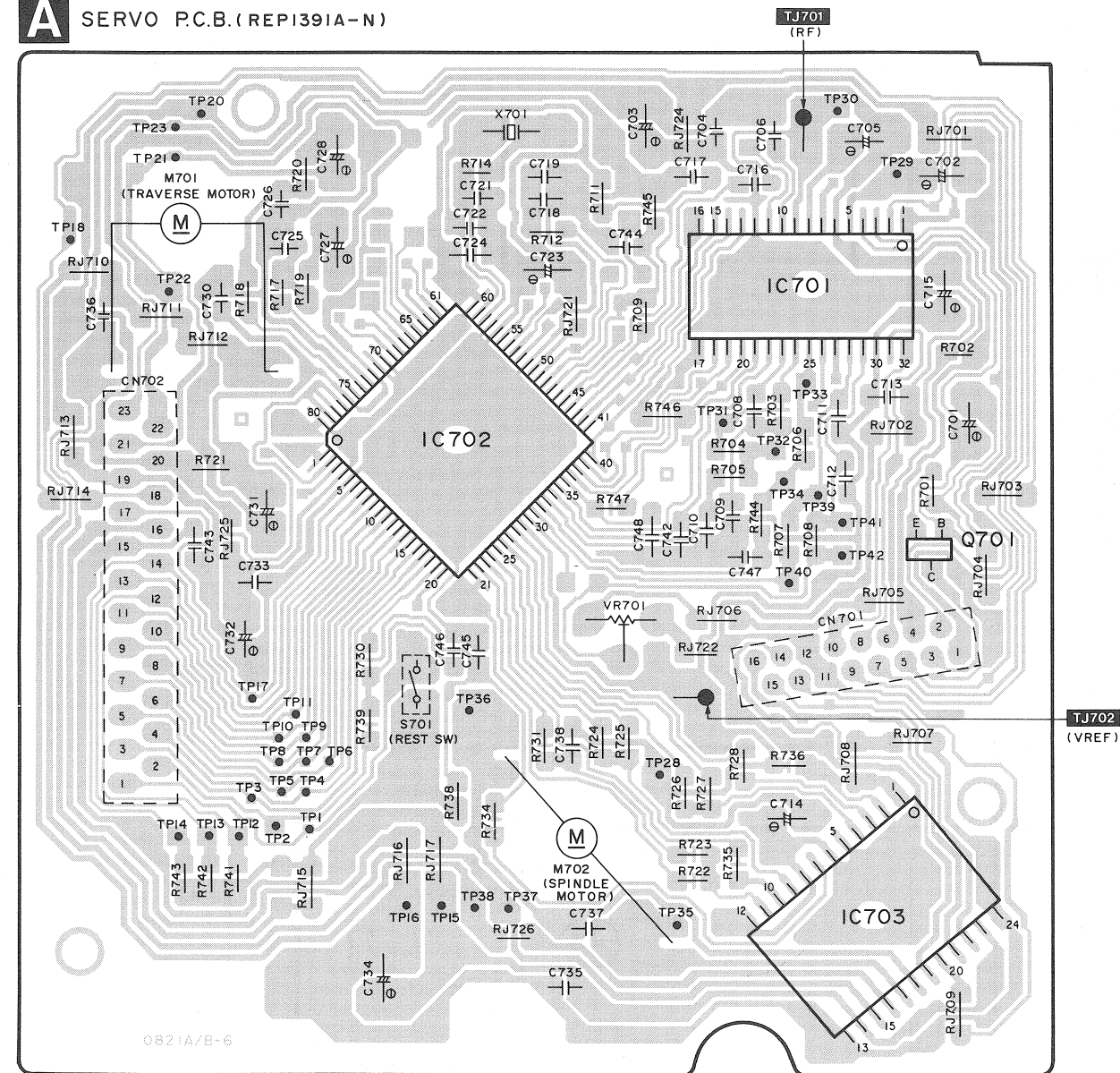
E MAIN CIRCUIT

F POWER SUPPLY CIRCUIT

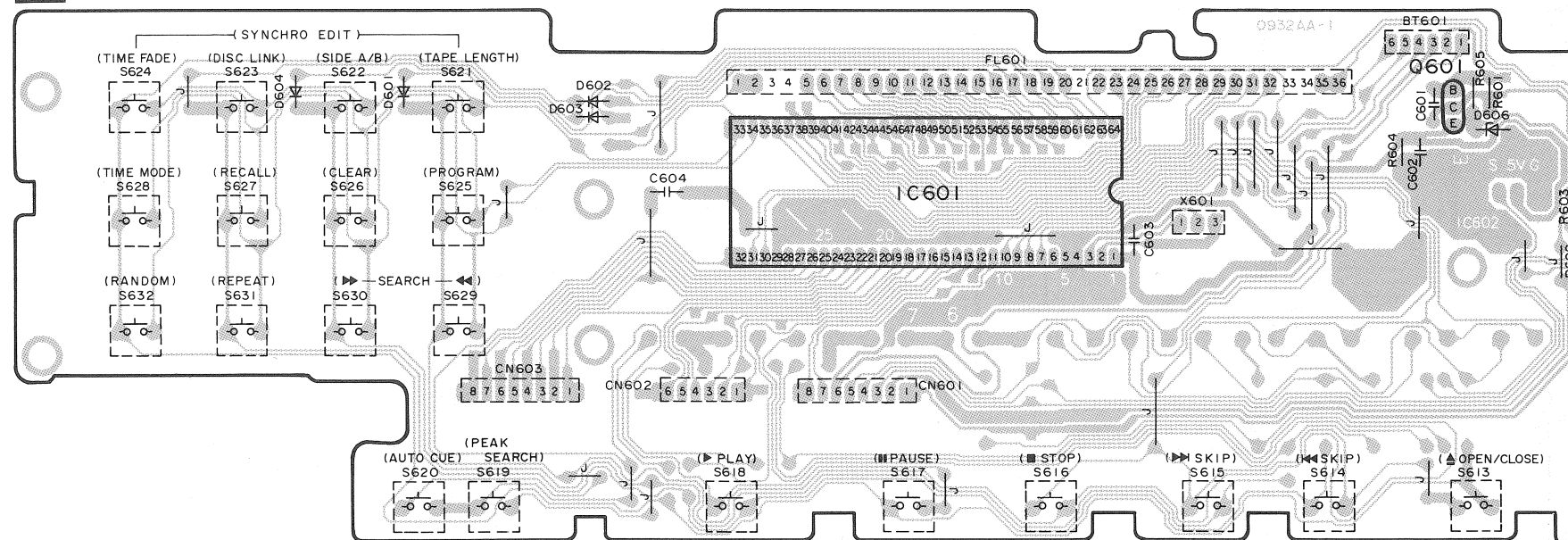


PRINTED CIRCUIT BOARDS

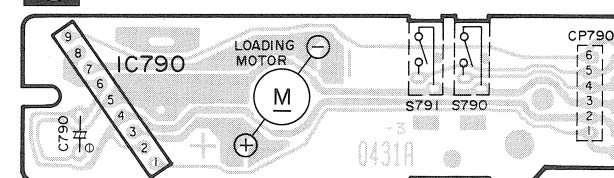
A SERVO P.C.B.(REP1391A-N)



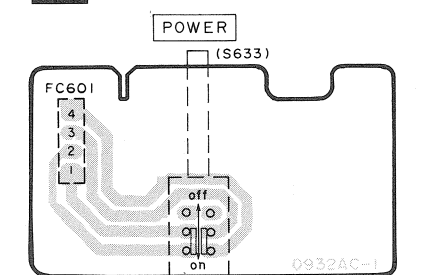
B FL/OPERATION P.C.B.(REP1459B-S)



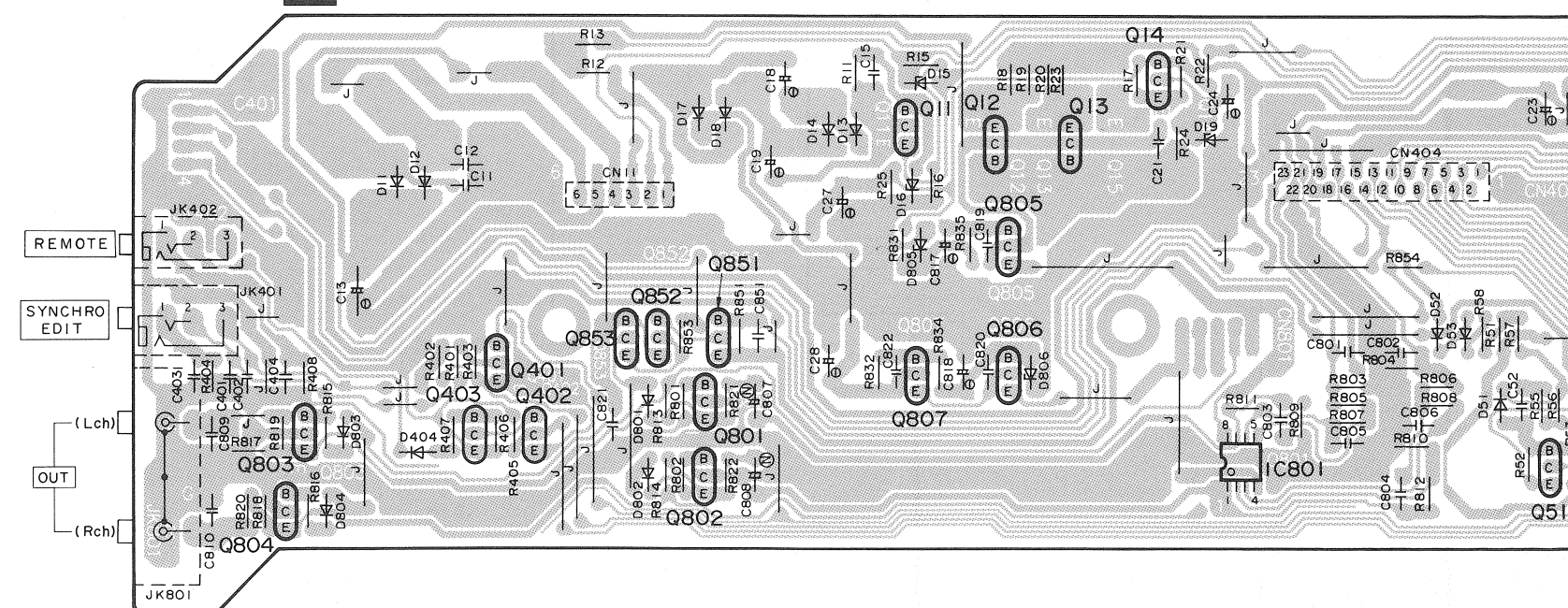
C LOADING MOTOR P.C.B.(REP0767)



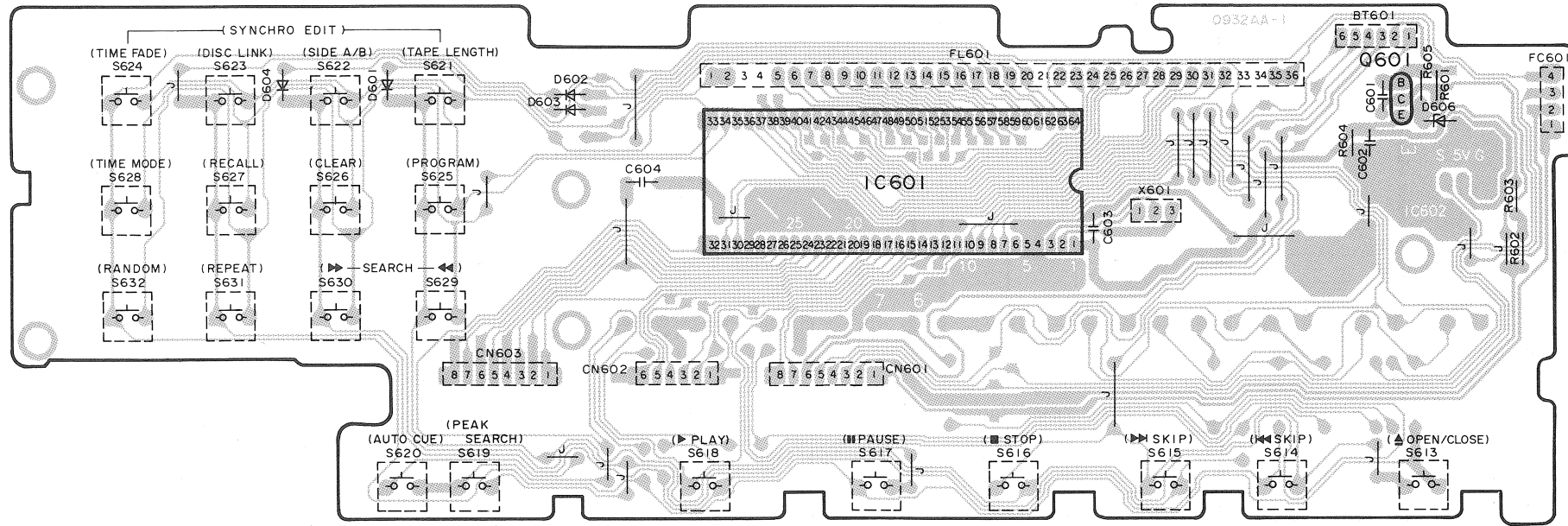
D POWER SWITCH P.C.B.(REP1459B-S)



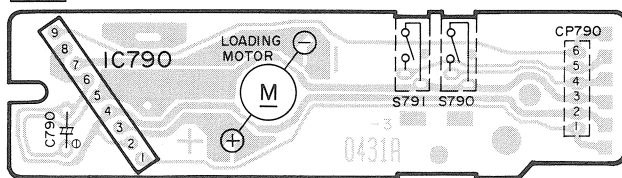
E MAIN P.C.B.(REP1458C-M)



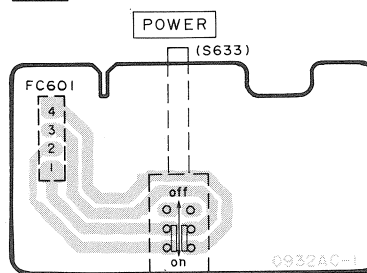
B FL/OPERATION P.C.B.(REP1459B-S)



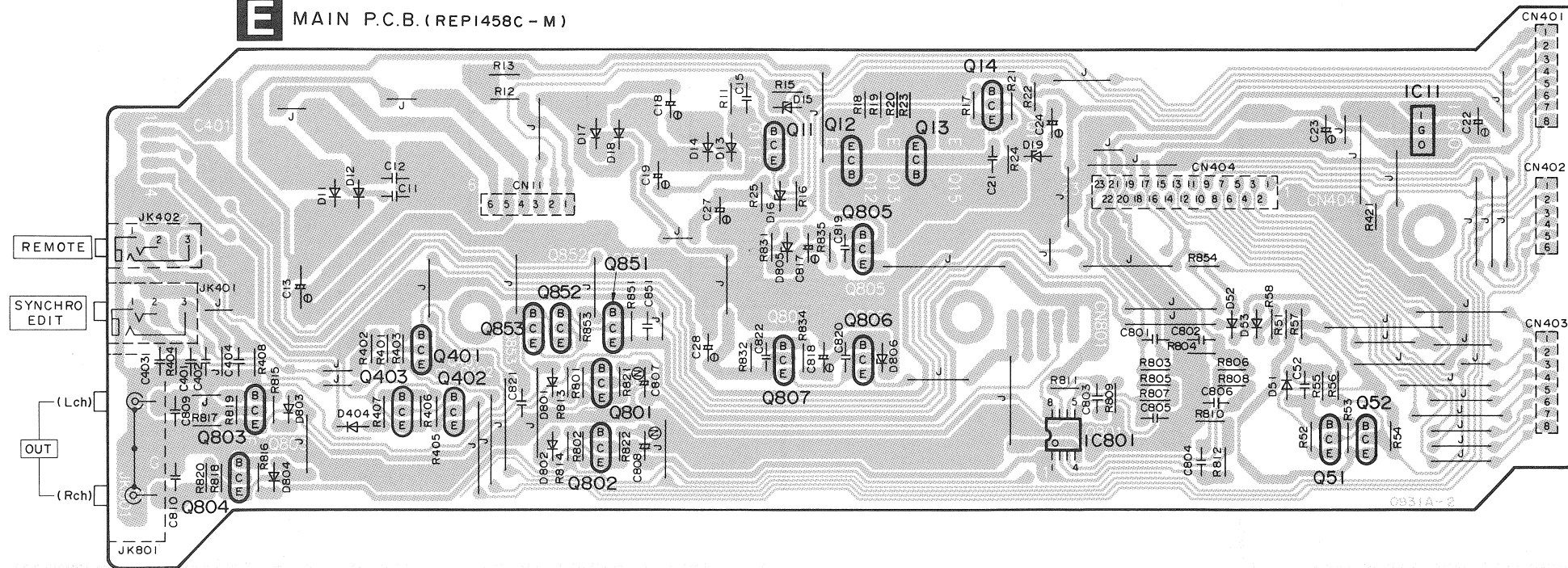
C LOADING MOTOR P.C.B.(REP0767)



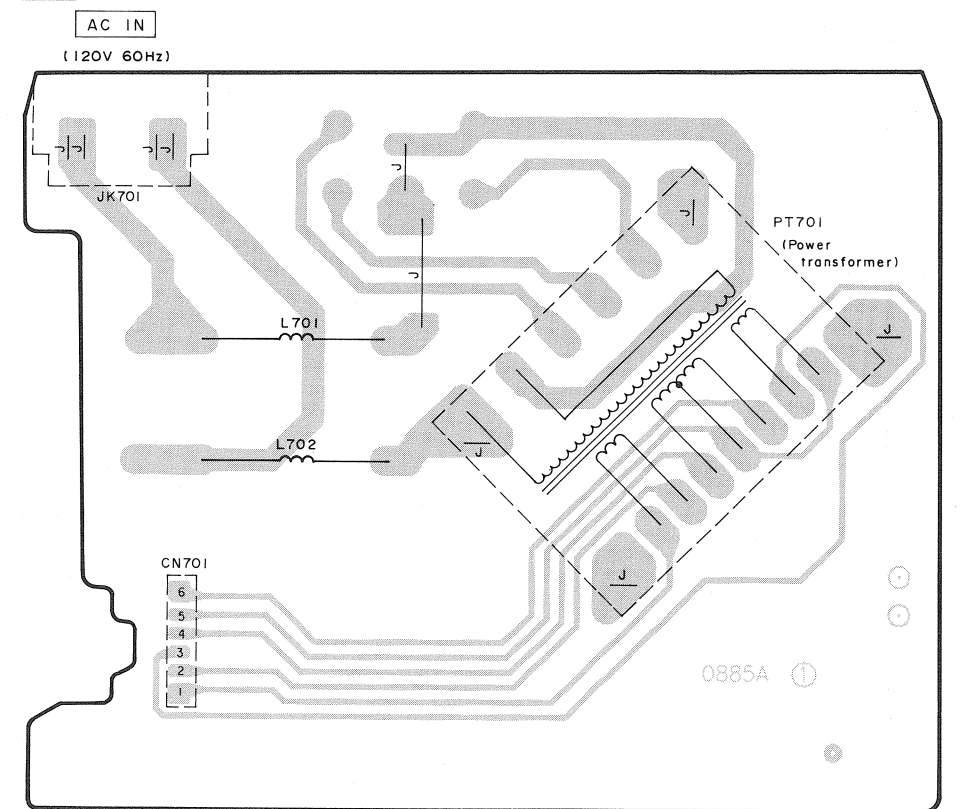
D POWER SWITCH P.C.B.(REP1459B-S)



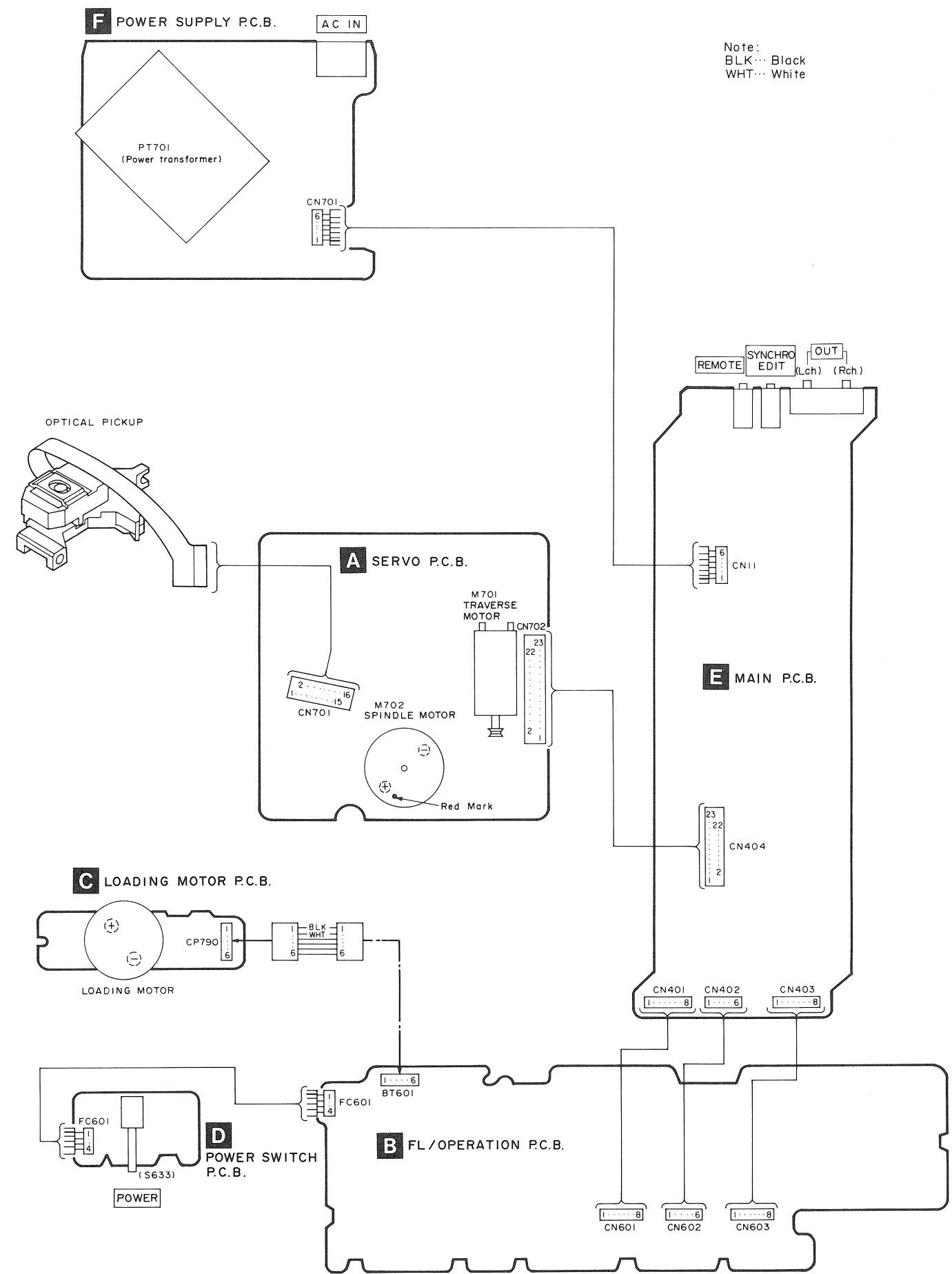
E MAIN P.C.B.(REP1458C-M)



F POWER SUPPLY P.C.B.(REP1395A-P)

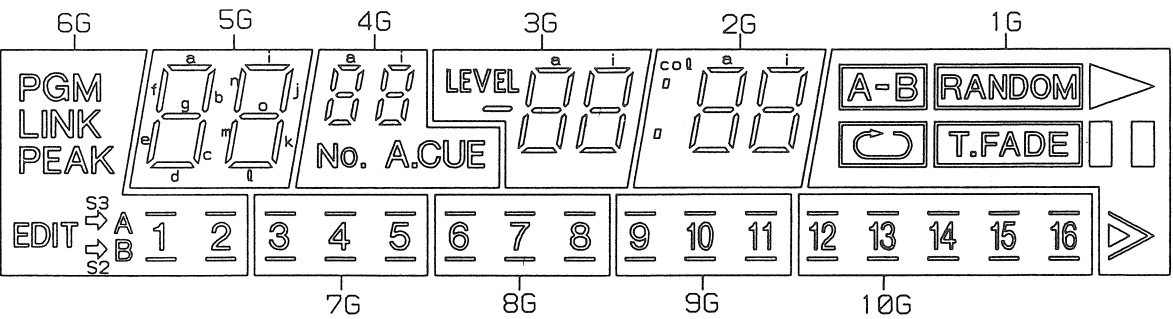


■ WIRING CONNECTION DIAGRAM



■ INTERNAL CONNECTION OF FL

• Grid connection diagram



• Anode connection table

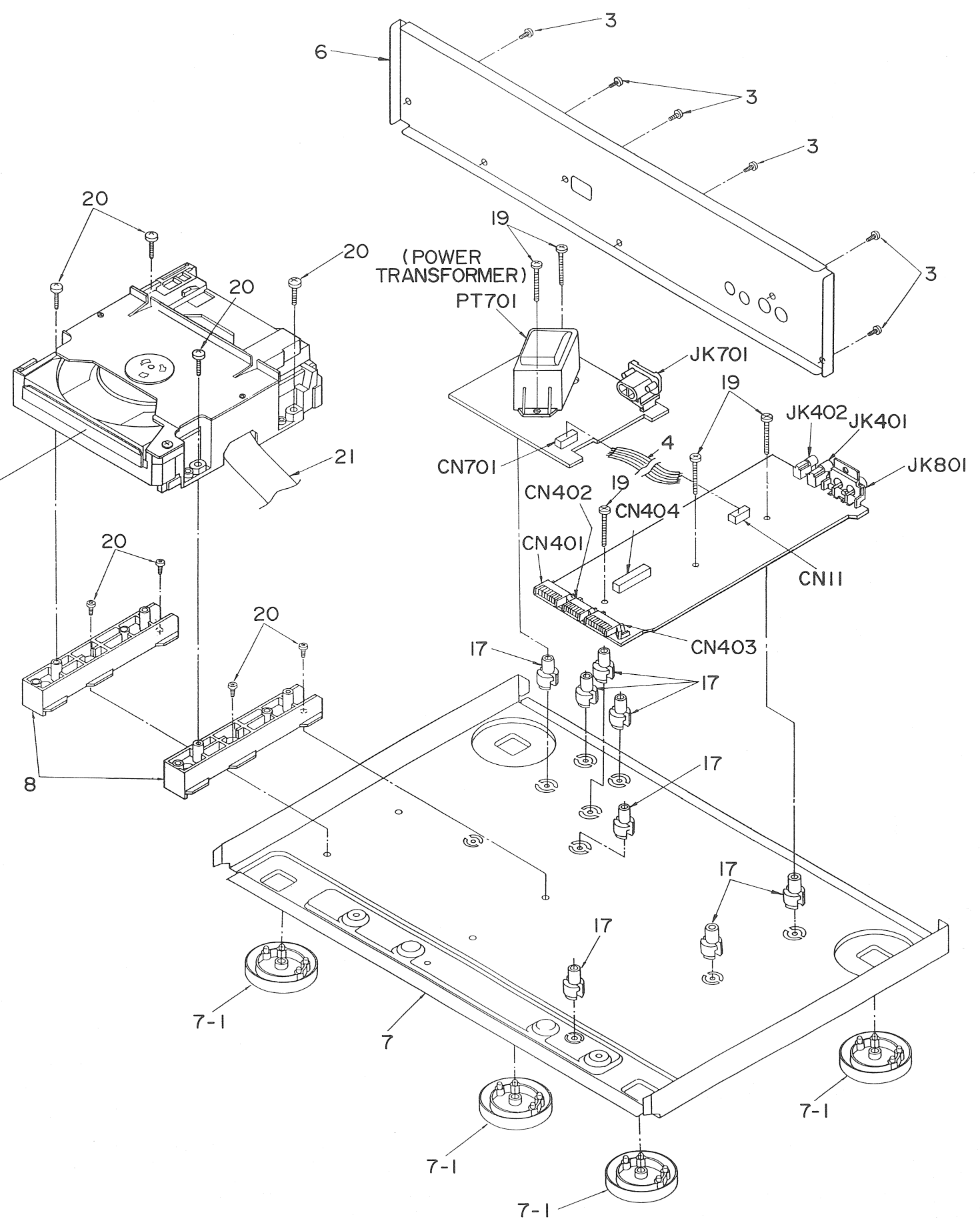
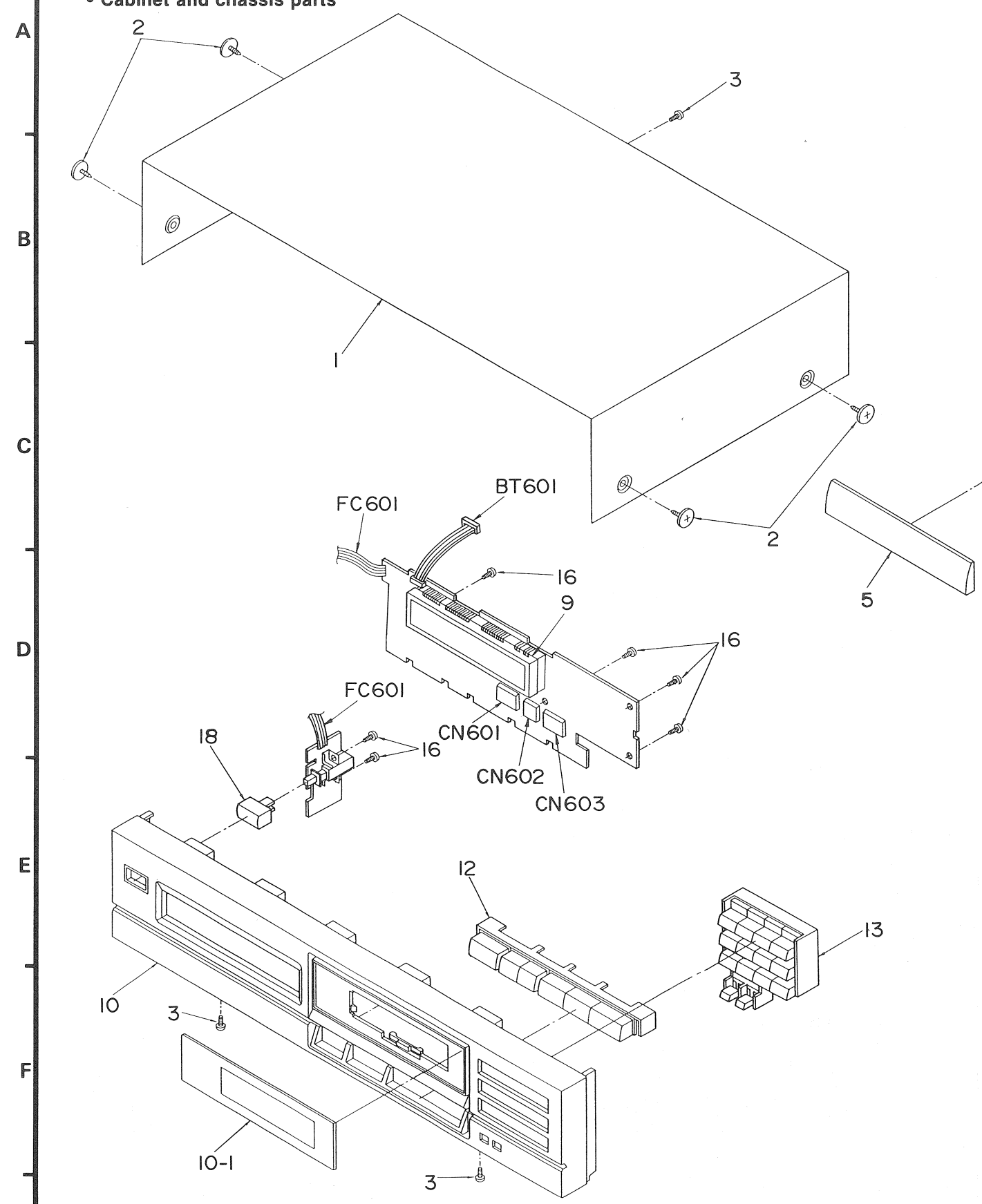
	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
P1	12	9	6	3	EDIT A/B	a	a	a	a	▶
P2	—(12)	—(9)	—(6)	—(3)	S2	b	b	b	b	□□
P3	—(12)	—(9)	—(6)	—(3)	S3	f	f	f	f	RANDOM
P4	13	10	7	4	1	g	g	g	g	T.FADE
P5	—(13)	—(10)	—(7)	—(4)	—(1)	c	c	c	c	↻
P6	—(13)	—(10)	—(7)	—(4)	—(1)	e	e	e	e	A-
P7	14	11	8	5	2	d	d	d	d	B
P8	—(14)	—(11)	—(8)	—(5)	—(2)	—	No.	—	col	▷
P9	—(14)	—(11)	—(8)	—(5)	—(2)	i	i	i	i	>
P10	15	—	—	—	PGM	j	j	j	j	—
P11	—(15)	—	—	—	LINK	n	n	n	n	—
P12	—(15)	—	—	—	—	o	o	o	o	—
P13	16	—	—	—	PEAK	k	k	k	k	—
P14	—(16)	—	—	—	—	m	m	m	m	—
P15	—(16)	—	—	—	—	l	l	l	l	—
P16	—	—	—	—	—	—	ACUE	LEVEL	—	—

• Pin connection

PIN NO.	33333333222222221111111111	6543210987654321098765432109876543210
CONNECTION	FFNN1234567890NPNPPPPPPPP1111112345678901234	

EXPLODED VIEWS

Cabinet and chassis parts



11

12

13

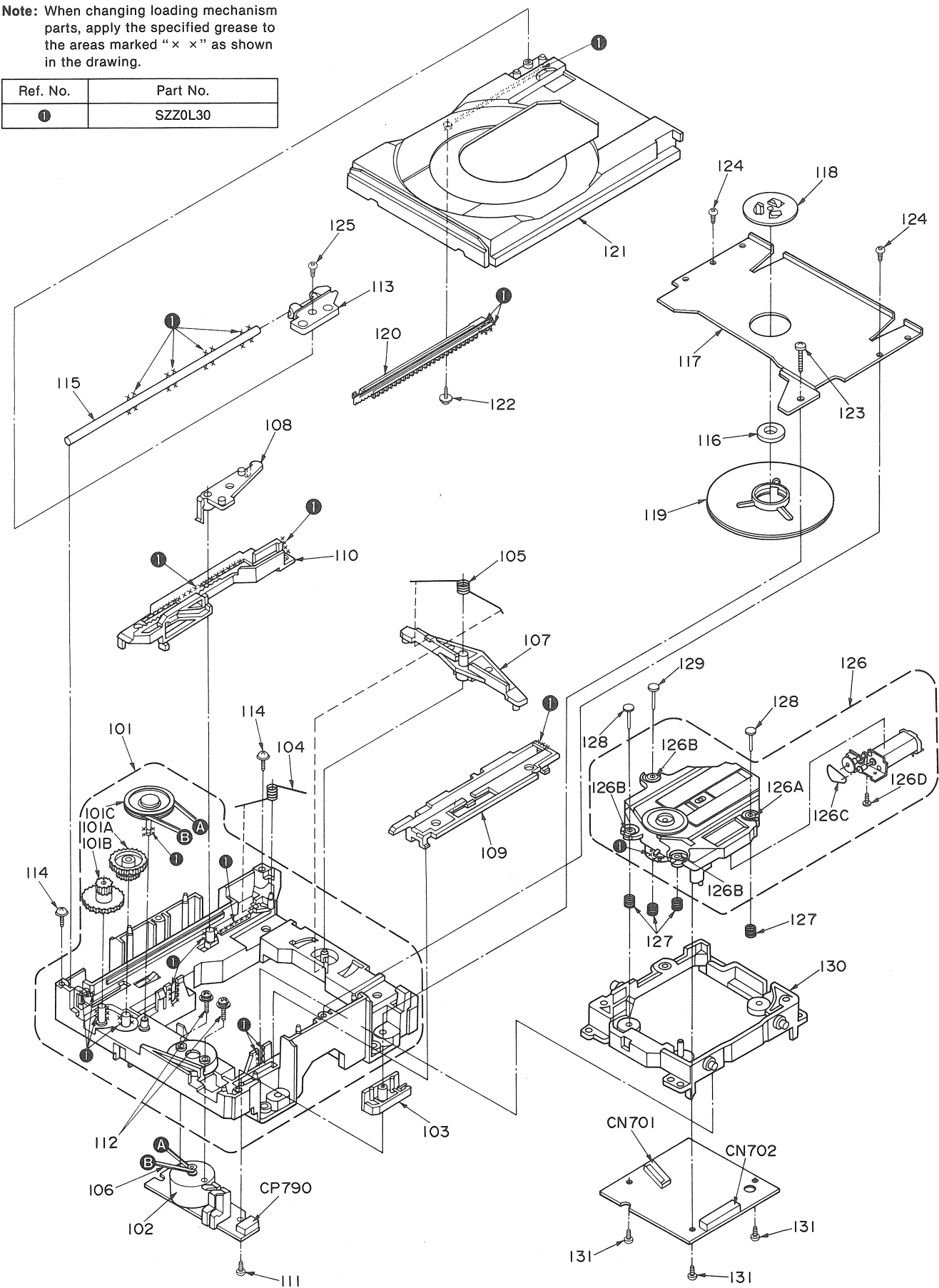
14

15

• Loading mechanism parts

Note: When changing loading mechanism parts, apply the specified grease to the areas marked "x x" as shown in the drawing.

Ref. No.	Part No.
①	SZZ0L30



REPLACEMENT PARTS LIST

Notes: *Important safety notice:
Components identified by △ mark have special characteristics important for safety.
Furthermore, special parts which have purposes of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used.
When replacing any of components, be sure to use only manufacturer's specified parts shown in the parts list.
*The parenthesized indications in the Remarks columns specify the areas. (Refer to the cover page for area.)
Parts without these indications can be used for all areas.
*Warning: This product uses a laser diode. Refer to caution statements on page 2.

Ref. No.	Part No.	Part Name & Description	Remarks	Ref. No.	Part No.	Part Name & Description	Remarks
		CABINET AND CHASSIS		119	RXQ0123	MAGNET HOLDER ASS'Y	
				120	RFKNLPG440-K	DRIVE GEAR(2) ASS'Y	
				121	RGQ0088-K	DISC TRAY	
1	RKM0114-K	CABINET		122	RHD20009-1	SCREW	
2	SNE2129-1	SCREW		123	XTB3+25GFZ	SCREW	
3	XTBS3+8JFZ1	SCREW		124	XTN26+6G	SCREW	
4	REZ0522	FLAT CABLE(6P)		125	XTN3+8JFZ	SCREW	
5	RGK0313-K	TRAY ORNAMENT		126	RAE0111Z	TRAVERSE DECK UNIT	
6	RGR0082P-A	REAR PANEL		126A	SHGD112	FLOATING RUBBER(A)	
7	RFKJLPG440AK	CHASSIS ASS'Y		126B	SHGD113-1	FLOATING RUBBER(B)	
7-1	RKA0053-A	FOOT		126C	RDV0023	BELT	
8	RMR0359	MECHANISM SPACER		126D	SNSD38	SCREW	
9	RMN0185-1	FL HOLDER		127	RME0109	FLOATING SPRING	
10	RFKGLPG340PK	FRONT PANEL ASS'Y		128	RMS0123-1	FIXED PIN(A)	
10-1	RKW0127A	FRONT ORNAMENT PLATE		129	RMS0350	FIXED PIN(B)	
12	RGU0467A-K2	MAIN BUTTON		130	RMR0533-K	TRAVERSE CHASSIS	
13	RGU0468-K2	SUB BUTTON		131	XTV2+6G	SCREW	
16	XTBS26+8J	SCREW					
17	SHE187-2	P. C. B. SUPRORT				PACKING MATERIAL	
18	RGU0030	POWER BUTTON					
19	XTB3+20JFZ	SCREW		P1	RPG1398	PACKING CASE	
20	XTB3+8JFZ	SCREW		P2	RPN0416	CUSHION	
21	REZ0528	FLAT CABLE(23P)		P3	RPQ0272	PAD	
		LOADING MECHANISM		P4	XZB60X65A01Z	PROTECTION BAG(UNIT)	
				P5	XZB22X20C03	PROTECTION BAG(CORD)	
						ACCESSORIES	
101	RFKJLPG440BK	MECHANISM CHASSIS ASS'Y					
101A	RDG0142	INTERMEDIATE GEAR		A1	RQT1708-P	INSTRUCTION MANUAL	(P)
101B	RDG0193	DRIVE GEAR(1)		A1	RFKSLPG340PC	INSTRUCTION MANUAL ASS'Y	(PC)
101C	RDP0041	INTERMEDIATE PULLEY		A2	SJA175-1	AC POWER SUPPLY CORD	(P) △
102	REM0019	LOADING MOTOR ASS'Y		A2	SJA172	AC POWER SUPPLY CORD	(PC) △
103	RMA0339	TRAY HOLDER		A3	SJP2249-3	STEREO CONNECTION CABLE	
104	RME0063	LOCK LEVER SPRING		A4	SQX7179	WARRANTY CARD	(P)
105	RME0087	ASSISTANCE SPRING		A4	SQX7183	WARRANTY CARD	(PC)
106	RMG0158	BELT		A5	SQX9129-1	SERVICENTER LIST	(P)
107	RML0177	CONVERSION LEVER		A5	SQX9131	SERVICENTER LIST	(PC)
108	RML0178-1	LOCK LEVER		A6	SJP2257T	REMOTE CONTROL CABLE	
109	RMM0059-1	SLIDE PLATE(2)					
110	RMM0079	SLIDE PLATE(1)					
111	XTN26+6G	SCREW					
112	XYN2+F6FZ	SCREW					
113	RDB0036	GUIDE SHAFT HOLDER					
114	RHD20010	SCREW					
115	RMU0046	GUIDE SHAFT					
116	RHM245ZA	MAGNET					
117	RMA0327-1	CLAMP PLATE					
118	RMR0334	FIXED PLATE					

[illegible]

RESISTORS AND CAPACITORS

Notes : * Capacity values are in microfarads (uF) unless specified otherwise, P=Pico-farads (pF) F=Farads (F)
* Resistance values are in ohms, unless specified otherwise, 1K=1,000 (OHM), 1M=1,000k (OHM)

Ref. No.	Part No.	Values & Remarks	Ref. No.	Part No.	Values & Remarks	Ref. No.	Part No.	Values & Remarks
		RESISTORS	R854	ERDS2TJ332	1/4W 3. 3K	R728	ERJ6GEYJ392V	1/10W 3. 9K
					CAPACITORS	R730	ERJ6GEYJ331V	1/10W 330
R11	ERDS2TJ123	1/4W 12K				R731	ERJ6GEYJ392V	1/10W 3. 9K
R12, 13	ERDS2TJ150T	1/4W 15	C11, 12	ECBT1E103ZF	25V 0. 01U	R734-736	ERJ6GEYJ101V	1/10W 100
R15, 16	ERDS2TJ472	1/4W 4. 7K	C13	ECEA1EU222B	25V 2200U Δ	R738	ERJ6GEYJ223V	1/10W 22K
R17	ERDS2TJ821	1/4W 820	C15	ECBT1H102KB5	50V 1000P	R739	ERJ6GEYJ681V	1/10W 680
R18-20	ERDS2TJ1R0	1/4W 1. 0	C18, 19	ECA1HM470B	50V 47U Δ	R741-743	ERJ6GEYJ562V	1/10W 5. 6K
R21	ERDS2TJ473	1/4W 47K	C21	ECBT1E103ZF	25V 0. 01U	R744	ERJ6GEYJ103V	1/10W 10K
R22	ERDS2TJ472	1/4W 4. 7K	C22	ECA1AM331B	10V 330U	R745	ERJ6GEYJ155V	1/10W 1. 5M
R23	ERDS2TJ1R0	1/4W 1. 0	C23	ECEA0JKA101B	6. 3V 100U	R746	ERJ8GEYJ103V	1/8W 10K
R24	ERDS2TJ680T	1/4W 68	C24	ECEA1AKA330B	10V 33U	R747	ERJ6GEYJ473V	1/10W 47K
R25	ERDS2TJ472	1/4W 4. 7K	C27	ECEA1EKA470B	25V 47U Δ			CHIP JUMPERS
R51	ERDS2TJ472	1/4W 4. 7K	C28	ECA1EM221B	25V 220U Δ			
R52	ERDS2TJ153	1/4W 15K	C52	ECFR1E104ZF5	25V 0. 1U	RJ701-717	ERJ8GEYOR00A	CHIP JUMPER
R53	ERDS2TJ184T	1/4W 180K	C401-404	ECBT1E103ZF	25V 0. 01U	RJ721, 722	ERJ6GEYOR00A	CHIP JUMPER
R54	ERDS2TJ472	1/4W 4. 7K	C601-604	ECBT1E103ZF	25V 0. 01U	RJ724-726	ERJ6GEYOR00A	CHIP JUMPER
R55	ERDS2TJ562	1/4W 5. 6K	C790	ECA1AKF820E	10V 82U			
R56	ERDS2TJ184T	1/4W 180K	C801, 802	ECBT1H102KB5	50V 1000P			CAPACITORS
R57	ERDS2TJ103	1/4W 10K	C803-806	ECBR1H391J5	50V 390P			
R58	ERDS2TJ101	1/4W 100	C807, 808	ECEA1AN470S	10V 47U	C701	ECEA0JKA220	6. 3V 22U
R401, 402	ERDS2TJ102	1/4W 1K	C809, 810	ECBT1H102KB5	50V 1000P	C702	ECEA1HKA010I	50V 1U
R403	ERDS2TJ273	1/4W 27K	C817, 818	ECEA1AKA330B	10V 33U	C703	ECEA0JKA101I	6. 3V 100U
R404	ERDS2TJ100	1/4W 10	C819-822	ECBT1E103ZF	25V 0. 01U	C704	ECUZ1E104MBN	25V 0. 1U
R405	ERDS2TJ103	1/4W 10K	C851	ECBT1E103ZF	25V 0. 01U	C705	ECEA1HKA010I	50V 1U
R406	ERDS2TJ562	1/4W 5. 6K			<SERVO P. C. B. >	C706	ECUE1H101JCN	50V 100P
R407	ERDS2TJ272T	1/4W 2. 7K			RESISTORS	C708	ECUE1H472KBN	50V 4700P
R408	ERDS2TJ100	1/4W 10				C709	ECUE1C473KBN	16V 0. 047U
R421	ERDS2TJ102	1/4W 1K				C710	ECUE1H152KBN	50V 1500P
R601	ERDS2TJ2R2T	1/4W 2. 2	R701	ERJ6GEYJ100	1/10W 10	C711, 712	ECUZ1E104MBN	25V 0. 1U
R602, 603	ERDS2TJ101	1/4W 100	R702	ERJ6GEYJ471V	1/10W 470	C713	ECUV1C104MBM	16V 0. 1U
R604	ERDS2TJ472	1/4W 4. 7K	R703	ERJ6GEYJ823	1/10W 82K	C714	ECEA0JKA101I	6. 3V 100U
R605	ERDS2TJ101	1/4W 100	R704	ERJ6GEYJ102A	1/10W 1K	C715	ECEA0JKA470I	6. 3V 47U
R801, 802	ERDS2TJ102	1/4W 1K	R705	ERJ6GEYJ103V	1/10W 10K	C716	ECUE1H561KBN	50V 560P
R803, 804	ERDS2TJ224T	1/4W 220K	R706	ERJ6GEYJ102A	1/10W 1K	C717	ECUZ1E104MBN	25V 0. 1U
R805, 806	ERDS2TJ822	1/4W 8. 2K	R707	ERJ6GEYJ473V	1/10W 47K	C718, 719	ECUV1C224KBM	16V 0. 22U
R807, 808	ERDS2TJ123	1/4W 12K	R708	ERJ6GEYJ224V	1/10W 220K	C721, 722	ECUE1H100DCN	50V 10P
R809-812	ERDS2TJ393	1/4W 39K	R709	ERJ6GEYJ683V	1/10W 68K	C723	ECEA1AKA221I	10V 220U
R813, 814	ERDS2TJ221	1/4W 220	R711	ERJ6GEYJ154V	1/10W 150K	C724	ECUV1C104MBM	16V 0. 1U
R815, 816	ERDS2TJ102	1/4W 1K	R712	ERJ6GEYJ471V	1/10W 470	C725, 726	ECUE1H102KBN	16V 0. 1U
R817, 818	ERDS2TJ473	1/4W 47K	R714	ERJ6GEYOR00A	1/10W 0. 00	C727, 728	ECEA1HPK010I	50V 1U
R819, 820	ERDS2TJ561	1/4W 560	R717-720	ERJ6GEYJ102A	1/10W 1K	C730	ECUZ1E104MBN	25V 0. 1U
R821, 822	ERDS2TJ221	1/4W 220	R721	ERJ8GEYJ101V	1/8W 100	C731, 732	ECA05SD151I	6. 3V 150U
R831	ERDS2TJ222	1/4W 2. 2K	R722	ERJ6GEYJ473V	1/10W 47K	C733	ECUZ1E104MBN	25V 0. 1U
R832	ERDS2TJ102	1/4W 1K	R723	ERJ6GEYJ182V	1/10W 1. 8K	C734	ECEA1AKA221I	10V 220U
R834	ERDS2TJ102	1/4W 1K	R724	ERJ6GEYJ333V	1/10W 33K	C735-737	ECUZNE104MBN	25V 0. 1U
R835	ERDS2TJ680T	1/4W 68	R725	ERJ6GEYJ472V	1/10W 4. 7K	C738	ECUV1C154KBN	16V 0. 15U
R851	ERDS2TJ472	1/4W 4. 7K	R726	ERJ6GEYJ473V	1/10W 47K	C742	ECUV1E273KBN	25V 0. 027U
R853	ERDS2TJ222	1/4W 2. 2K	R727	ERJ6GEYJ103V	1/10W 10K	C743	ECUZNE104MBN	25V 0. 1U

Ref. No.	Part No.	Values & Remarks
C744	ECUE1E822KBN	25V 8200P
C745	ECUE1C473MBN	16V 0.047U
C746	ECUE1H050DCN	50V 5P
C747	ECUE1H222KBN	50V 2200P
C748	ECUV1H271KBM	50V 270P

■ PACKAGING

